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Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals

Report of the Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals on its seventh session

held in Geneva on 12 December 2014

Addendum

Annex I

Amendments to the eighteenth revised edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations (ST/SG/AC.10/1/Rev.18)*

* For technical reasons, the paper version of this document is printed in black and white. For page 29 the electronic version should be consulted. For the Lithium battery mark in Figure 5.2.5 the hatching should be in red.

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Recommendations

In Recommendation 8, replace "ST/SG/AC.10/11/Rev.5, Amend.1 and Amend.2" by "ST/SG/AC.10/11/Rev.6".

Model regulations

Chapter 1.1

In NOTE 1 after the heading of the Chapter, replace "*ST/SG/AC.10/11/Rev.5, Amend.1 and Amend.2*" by "*ST/SG/AC.10/11/Rev.6*".

1.1.1.2 Insert a new NOTE 3 to read as follows:

"***NOTE 3:*** *1.1.1.2 (a) above is only applicable to the means of transport performing the transport operation.*".

1.1.1.7 Add the following new sentence at the end of the paragraph under 1.1.1.7: "The requirements of the standard that do not conflict with these Regulations shall be applied as specified, including the requirements of any other standard, or part of a standard, referenced within that standard as normative.".

Chapter 1.2

1.2.1 In the definition of "*Aerosol or aerosol dispenser*", insert "an article consisting of" after "means".

1.2.1 Under the definition of "*CGA*", amend the address in brackets to read as follows: "(CGA, 14501 George Carter Way, Suite 103, Chantilly, VA 20151, United States of America)".

1.2.1 In the definition of "*GHS*", replace "fifth revised edition" by "sixth revised edition" and replace "ST/SG/AC.10/30/Rev.5" by "ST/SG/AC.10/30/Rev.6".

1.2.1 In the definition of "*Liquid*", replace "*ECE/TRANS/225 (Sales No. E.12.VIII.1)*" by "*ECE/TRANS/225 (Sales No. E.14.VIII.1)*".

1.2.1 In the definition of "*Manual of Tests and Criteria*", replace "fifth revised edition" by "sixth revised edition" and replace "ST/SG/AC.10/11/Rev.5, Amend.1 and Amend.2" by "ST/SG/AC.10/11/Rev.6".

1.2.1 In the definition of "*Large salvage packaging*", replace "or leaking" by ", leaking or non-conforming".

1.2.1 In the definition of "*Salvage pressure receptacle*" replace "1 000" by "3 000".

1.2.1 In the definition of "*Tube*", replace "a seamless transportable pressure receptacle of" by "a transportable pressure receptacle of seamless or composite construction having".

1.2.1 Add the following new definitions in alphabetical order:

"*Design life*, for composite cylinders and tubes, means the maximum life (in number of years) to which the cylinder or tube is designed and approved in accordance with the applicable standard;".

"*Self-accelerating polymerization temperature (SAPT)* means the lowest temperature at which polymerization may occur with a substance in the packaging, IBC or portable tank as offered for transport. The SAPT shall be determined in accordance with the test procedures established for the self-accelerating decomposition temperature for self-reactive substances in accordance with Part II, Section 28 of the Manual of Tests and Criteria;".

"*Service life*, for composite cylinders and tubes, means the number of years the cylinder or tube is permitted to be in service;".

Chapter 2.0

2.0.0 Existing text becomes 2.0.0.1.

Add a new 2.0.0.2 to read as follows:

"2.0.0.2 A consignor who has identified, on the basis of test data, that a substance listed by name in column 2 of the Dangerous Goods List in Chapter 3.2 meets classification criteria for a hazard class or division that is not identified in the list, may, with the approval of the competent authority, consign the substance:

– Under the most appropriate generic or not otherwise specified (N.O.S.) entry reflecting all hazards; or

– Under the same UN number and name but with additional hazard communication information as appropriate to reflect the additional subsidiary risk(s) (documentation, label, placard) provided that the primary hazard class remains unchanged and that any other transport conditions (e.g. limited quantity, packaging and tank provisions) that would normally apply to substances possessing such a combination of hazards are the same as those applicable to the substance listed.

NOTE: *When a competent authority grants such approvals, it should inform the United Nations Sub-Committee of Experts on the Transport of Dangerous Goods accordingly and submit a relevant proposal of amendment to the Dangerous Goods List. Should the proposed amendment be rejected, the competent authority should withdraw its approval.".*

2.0.2.2 At the end, insert a new sentence to read as follows: "The substances listed by name in column (2) of the Dangerous Goods List of Chapter 3.2 shall be transported according to their classification in the list or under the conditions specified in 2.0.0.2.".

Chapter 2.1

2.1.1.4 (f) Amend the paragraph before the Note to read as follows:

"This division comprises articles which predominantly contain extremely insensitive substances and which demonstrate a negligible probability of accidental initiation or propagation.".

2.1.2.1.1 Amend the description for Compatibility Group N to read as follows: "Articles predominantly containing extremely insensitive substances".

2.1.3.5.1 In the second sentence, insert a paragraph brake after "However," and replace "," by ":". Remainder of the sentence becomes new sub-paragraph (b). Insert a new sub-paragraph (a) to read as follows:

"(a) waterfalls giving a positive result when tested in the HSL Flash composition test in Appendix 7 of the Manual of Tests and Criteria shall be classified as 1.1G regardless of the results of Test Series 6;".

2.1.3.5.5 In the table, for the entry "Fountain" in the column "Includes: / Synonym", delete "showers". In the third column, at the end, add the following Note:

"***NOTE:*** *Fountains intended to produce a vertical cascade or curtain of sparks are considered to be waterfalls (see row below).".*

After the row for "Fountain", insert a new row to read as follows:

Type	Includes: / Synonym:	Definition	Specification	Classification
Waterfall	cascades, showers	pyrotechnic fountain intended to produce a vertical cascade or curtain of sparks	containing a pyrotechnic substance which gives a positive result when tested in the HSL Flash composition test in Appendix 7 of the Manual of Tests and Criteria regardless of the results of Test Series 6 (see 2.1.3.5.1 (a))	1.1G
			containing a pyrotechnic substance which gives a negative result when tested in the HSL Flash composition test in Appendix 7 of the Manual of Tests and Criteria	1.3G

2.1.3 Add a new paragraph 2.1.3.7 to read as follows:

"2.1.3.7 *Classification documentation*

2.1.3.7.1 A competent authority assigning an article or substance into Class 1 should confirm with the applicant that classification in writing.

2.1.3.7.2 A competent authority classification document may be in any form and may consist of more than one page, provided pages are numbered consecutively. The document should have a unique reference.

2.1.3.7.3 The information provided shall be easy to identify, legible and durable.

2.1.3.7.4 Examples of the information that may be provided in the classification documents are as follows:

(a) The name of the competent authority and the provisions in national legislation under which it is granted its authority;

(b) The modal or national regulations for which the classification document is applicable;

(c) Confirmation that the classification has been approved, made or agreed in accordance with the United Nations Recommendations on the Transport of Dangerous Goods or the relevant modal regulations;

(d) The name and address of the person in law to which the classification has been assigned and any company registration which uniquely identifies a company or other body corporate under national legislation;

(e) The name under which the explosives will be placed onto the market or otherwise supplied for transport;

(f) The Proper Shipping Name, UN number, Class, Hazard Division and corresponding compatibility group of the explosives;

(g) Where appropriate, the maximum net explosive mass of the package or article;

(h) The name, signature, stamp, seal or other identification of the person authorised by the competent authority to issue the classification document is clearly visible;

(i) Where safety in transport or the hazard division is assessed as being dependent upon the packaging, the packaging mark or a description of the permitted:

- Inner packagings
- Intermediate packagings
- Outer packagings

(j) The classification document states the part number, stock number or other identifying reference under which the explosives will be placed onto the market or otherwise supplied for transport;

(k) The name and address of the person in law who manufactured the explosives and any company registration which uniquely identifies a company or other body corporate under national legislation;

(l) Any additional information regarding the applicable packing instruction and special packing provisions where appropriate;

(m) The basis for assigning the classification, i.e. whether on the basis of test results, default for fireworks, analogy with classified explosive, by definition from the Dangerous Goods List etc.;

(n) Any special conditions or limitations that the competent authority has identified as relevant to the safety for transport of the explosives, the communication of the hazard and international transport;

(o) The expiry date of the classification document is given where the competent authority considers one to be appropriate.".

Chapter 2.2

2.2 Insert a new 2.2.4 to read as follows:

"**2.2.4 Gases not accepted for transport**

Chemically unstable gases of Class 2 shall not be accepted for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport or unless transported in accordance with special packing provision (r) of packing instruction P200 (4) of 4.1.4.1, as applicable. For the precautions necessary to prevent polymerization, see special provision 386 of Chapter 3.3. To this end particular care shall be taken to ensure that receptacles and tanks do not contain any substances liable to promote these reactions.".

Chapter 2.3

2.3.2.2 Amend sub-paragraph (a) to read as follows:

"(a) The viscosity[1] and flash-point are in accordance with the following table:

Kinematic viscosity (extrapolated) ν (at near-zero shear rate) mm^2/s at 23 °C	**Flow-time t in seconds**	**Jet diameter (mm)**	**Flash-point, closed-cup (°C)**
$20 < \nu \leq 80$	$20 < t \leq 60$	4	above 17
$80 < \nu \leq 135$	$60 < t \leq 100$	4	above 10
$135 < \nu \leq 220$	$20 < t \leq 32$	6	above 5
$220 < \nu \leq 300$	$32 < t \leq 44$	6	above -1
$300 < \nu \leq 700$	$44 < t \leq 100$	6	above -5
$700 < \nu$	$100 < t$	6	No limit

".

Footnote 1 reads as follows:

"[1] *Viscosity determination: Where the substance concerned is non-Newtonian, or where a flow cup method of viscosity determination is otherwise unsuitable, a variable shear-rate viscometer shall be used to determine the dynamic viscosity coefficient of the substance, at 23 °C, at a number of shear rates. The values obtained are plotted against shear rate and then extrapolated to zero shear rate. The dynamic viscosity thus obtained, divided by the density, gives the apparent kinematic viscosity at near-zero shear rate.*".

Renumber existing footnote 1 in 2.3.4 as footnote 2.

2.3.2.5 Replace the introductory sentence by the following:

"**2.3.2.5** ***Viscous liquids***

2.3.2.5.1 Except as provided for in 2.3.2.5.2, viscous liquids which:".

Insert a new 2.3.2.5.2 to read as follows:

"2.3.2.5.2 Viscous liquids which are also environmentally hazardous, but meet all other criteria in 2.3.2.5.1, are not subject to any other provisions of these Regulations when they are transported in single or combination packagings containing a net quantity per single or inner packaging of 5 litres or less, provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8.".

2.3 Insert a new 2.3.5 to read as follows:

"**2.3.5 Substances not accepted for transport**

Chemically unstable substances of Class 3 shall not be accepted for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport. For the precautions necessary to prevent polymerization, see special provision 386 of Chapter 3.3. To this end particular care shall be taken to ensure that receptacles and tanks do not contain any substances liable to promote these reactions.".

Chapter 2.4

2.4.1.1 (a) Insert "and polymerizing substances" after "through friction; self-reactive substances".

2.4.1.2 Insert a new sub-paragraph (c) to read as follows:

"(c) Polymerizing substances (Division 4.1);".

2.4.1.2 Renumber sub-paragraphs (c) to (f) as (d) to (g) respectively.

2.4.1.2 In the last sentence after the sub-paragraphs, insert "and polymerizing substances" after "self-reactive substances".

2.4.2 In the heading, replace "and" by "," and insert "and polymerizing substances" at the end.

2.4.2.1 In sub-paragraph (b), delete "and" at the end. Amend the end of sub-paragraph (c) to read "...(see 2.4.2.2); and". Add a new sub-paragraph (d) to read as follows:

"(d) Polymerizing substances (see 2.4.2.5).".

Insert a new 2.4.2.5 to read as follows:

"**2.4.2.5** ***Division 4.1 Polymerizing substances and mixtures (stabilized)***

2.4.2.5.1 *Definitions and properties*

Polymerizing substances are substances which, without stabilization, are liable to undergo a strongly exothermic reaction resulting in the formation of larger molecules or resulting in the formation of polymers under conditions normally encountered in transport. Such substances are considered to be polymerizing substances of Division 4.1 when:

(a) Their self-accelerating polymerization temperature (SAPT) is 75 °C or less under the conditions (with or without chemical stabilization as offered for transport) and in the packaging, IBC or portable tank in which the substance or mixture is to be transported;

(b) They exhibit a heat of reaction of more than 300 J/g; and

(c) They do not meet any other criteria for inclusion in Classes 1 to 8.

A mixture meeting the criteria of a polymerizing substance shall be classified as a polymerizing substance of Division 4.1.

2.4.2.5.2 Polymerizing substances are subject to temperature control in transport if their self-accelerating polymerization temperature (SAPT) is:

(a) When offered for transport in a packaging or IBC, 50 °C or less in the packaging or IBC in which the substance is to be transported; or

(b) When offered for transport in a portable tank, 45 °C or less in the portable tank in which the substance is to be transported.

2.4.2.5.3 Polymerizing substances that also meet the criteria of 2.9.3 shall be consigned under the appropriate polymerizing substance entry.".

2.4.4.3.3 Replace "equal to or greater than 1 litre" by "greater than 1 litre".

Chapter 2.5

2.5.3.2.4 In the table, amend the entries listed below as indicated:

Organic peroxide		*Column*	*Amendment*
DIBENZOYL PEROXIDE	(first row)	Concentration (%)	Replace ">51 - 100" by ">52 - 100"
tert-BUTYL CUMYL PEROXIDE	(first row)	Number (Generic entry)	Replace "3107" by "3109"
DICETYL PEROXYDICARBONATE	(first row)	Packing Method	Replace "OP7" by "OP8"
DICETYL PEROXYDICARBONATE	(first row)	Number (Generic entry)	Replace "3116" by "3120"
tert-BUTYL PEROXY-3,5,5-TRIMETHYLHEXANOATE	(first row)	Concentration (%)	Replace ">32-100" by ">37-100"
tert-BUTYL PEROXY-3,5,5-TRIMETHYLHEXANOATE	(third row)	Concentration (%)	Replace "≤ 32" by "≤37"
tert-BUTYL PEROXY-3,5,5-TRIMETHYLHEXANOATE	(third row)	Diluent type B (%)	Replace "≥ 68" by "≥ 63"

Chapter 2.6

Insert a new 2.6.2.5 to read as follows:

"**2.6.2.5** ***Substances not accepted for transport***

Chemically unstable substances of Division 6.1 shall not be accepted for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport. For the precautions necessary to prevent polymerization, see special provision 386 of Chapter 3.3. To this end particular care shall be taken to ensure that receptacles and tanks do not contain any substances liable to promote these reactions.".

Chapter 2.7

2.7.2.4.1.3 (b) Replace "marking "RADIOACTIVE"" by "mark "RADIOACTIVE"" wherever it appears.

2.7.2.4.1.4 (b) Replace "marking "RADIOACTIVE"" by "mark "RADIOACTIVE"".

Chapter 2.8

Insert a new 2.8.3 to read as follows:

"**2.8.3 Substances not accepted for transport**

Chemically unstable substances of Class 8 shall not be accepted for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport. For the precautions

necessary to prevent polymerization, see special provision 386 of Chapter 3.3. To this end particular care shall be taken to ensure that receptacles and tanks do not contain any substances liable to promote these reactions.".

Chapter 2.9

2.9.2 Under ***Substances and articles which, in the event of fire, may form dioxins***

After "3151 POLYHALOGENATED BIPHENYLS, LIQUID or", add a new entry to read as follows: "3151 HALOGENATED MONOMETHYLDIPHENYLMETHANES, LIQUID or".

After "3152 POLYHALOGENATED BIPHENYLS, SOLID or", add a new entry to read as follows: "3152 HALOGENATED MONOMETHYLDIPHENYLMETHANES, SOLID or".

2.9.2 Under ***Other substances....*** delete the following entries:

"3166 ENGINE, INTERNAL COMBUSTION or

3166 ENGINE, FUEL CELL, FLAMMABLE GAS POWERED or

3166 ENGINE, FUEL CELL, FLAMMABLE LIQUID POWERED or".

2.9.2 Under ***Other substances....*** add the following new entries:

3530 ENGINE, INTERNAL COMBUSTION or

3530 MACHINERY, INTERNAL COMBUSTION or".

2.9.3.2.5 In the second paragraph, in the first sentence, amend the end to read as follows: "... OECD Test Guidelines 107, 117 or 123.".

Chapter 3.1

3.1.2.2 At the end of the first sentence, replace "package marking" by "package marks".

3.1.2.3 At the end of the first sentence, replace "package marking" by "package marks".

3.1.2.6 In the introductory sentence, before sub-paragraphs (a) and (b), at the end, before "then:" insert "or the evolution of excessive heat, or when chemical stabilization is used in combination with temperature control.".

3.1.2.6 (a) Amend to read as follows:

"(a) For liquids and solids where the SAPT (measured without or with inhibitor, when chemical stabilization is applied) is less than or equal to that prescribed in 2.4.2.5.2, special provision 386 of Chapter 3.3 and the provisions of 7.1.6 apply;".

Chapter 3.2, Dangerous Goods List

For UN Nos. 1005 and 3516, add "379" in column (6).

For UN Nos. 1006, 1013, 1046, 1056, 1065, 1066, 1956, 2036, add "378" in column (6).

For UN Nos. 1010, 1051, 1060, 1081, 1082, 1085, 1086, 1087, 1092, 1093, 1143, 1167, 1185, 1218, 1246, 1247, 1251, 1301, 1302, 1303, 1304, 1545, 1589, 1614, 1724, 1829,

1860, 1917, 1919, 1921, 1991, 2055, 2200, 2218, 2227, 2251, 2277, 2283, 2348, 2352, 2383, 2396, 2452, 2521, 2527, 2531, 2607, 2618, 2838, 3022, 3073 and 3079, in column (6) insert "386".

For UN Nos. 1202, 1203, 1223, 1268 (all entries), 1863 (all entries) and 3475, in column (6) delete "363".

For UN No. 1415, add "T9" in column (10). Add "TP7" and "TP33" in column (11).

For UN No. 1950, in column (8), replace "LP02" by "LP200" and insert "381" in column (6).

For UN No. 1966, delete "TP23" in column (11).

For UN No. 2000, insert "383" in column (6).

For UN No. 2211, replace "207" by "382" in column (6).

For UN No. 2213, insert "223" in column (6).

For UN No. 2813, all entries, in column (9), delete "PP83".

For UN Nos. 2815, 2977 and 2978, in column (4) insert "6.1".

For UN No. 2983, replace "P200" by "P001" in column (8).

For UN Nos. 3090, 3091, 3480 and 3481, in column (6) insert "384" and in column (8), insert "P910".

For UN Nos. 3091 and 3481, insert "310" in column (6).

For UN No. 3151, amend column (2) to read as follows: "POLYHALOGENATED BIPHENYLS, LIQUIDS or HALOGENATED MONOMETHYLDIPHENYLMETHANES, LIQUIDS or POLYHALOGENATED TERPHENYLS, LIQUIDS".

For UN No. 3152, amend column (2) to read as follows: "POLYHALOGENATED BIPHENYLS, SOLIDS or HALOGENATED MONOMETHYLDIPHENYLMETHANES, SOLIDS or POLYHALOGENATED TERPHENYLS, SOLIDS".

For UN No. 3166, in column (2) amend the proper shipping name to read as follows: "VEHICLE, FLAMMABLE GAS POWERED or VEHICLE, FLAMMABLE LIQUID POWERED or VEHICLE, FUEL CELL, FLAMMABLE GAS POWERED or VEHICLE, FUEL CELL, FLAMMABLE LIQUID POWERED". Insert "380" and "385" in column (6).

For UN No. 3170, packing groups II and III, in column (10) delete "BK1".

For UN No. 3269, packing groups II and III, in column (2) add the following text at the end of the description: ", liquid base material".

For UN No. 3507, in column (3), replace "8" by "6.1" and in column (4), insert "8". In column (8), replace "P805" by "P603".

Add the following entries:

(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
3527	POLYESTER RESIN KIT, solid base material	4.1		II	236 340	5kg	E0	P412			
3527	POLYESTER RESIN KIT, solid base material	4.1		III	236 340	5kg	E0	P412			

(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
0510	ROCKET MOTORS?	1.4C				0	E0	P130 LP101	PP67 L1		
3528	ENGINE, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED or ENGINE, FUEL CELL, FLAMMABLE LIQUID POWERED or MACHINERY, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED or MACHINERY, FUEL CELL, FLAMMABLE LIQUID POWERED	3			363	0	E0	P005			
3529	ENGINE, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED or ENGINE, FUEL CELL, FLAMMABLE GAS POWERED or MACHINERY, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED or MACHINERY, FUEL CELL, FLAMMABLE GAS POWERED	2.1			363	0	E0	P005			
3530	ENGINE, INTERNAL COMBUSTION or MACHINERY, INTERNAL COMBUSTION	9			363	0	E0	P005			
3531	POLYMERIZING SUBSTANCE, SOLID, STABILIZED, N.O.S.	4.1		III	274 386	0	E0	P002 IBC07	PP92 B18	T7	TP4 TP6 TP33
3532	POLYMERIZING SUBSTANCE, LIQUID, STABILIZED, N.O.S.	4.1		III	274 386	0	E0	P001 IBC03	PP93 B19	T7	TP4 TP6
3533	POLYMERIZING SUBSTANCE, SOLID, TEMPERATURE CONTROLLED, N.O.S.	4.1		III	274 386	0	E0	P002 IBC07	PP92 B18	T7	TP4 TP6 TP33
3534	POLYMERIZING SUBSTANCE, LIQUID, TEMPERATURE CONTROLLED, N.O.S.	4.1		III	274 386	0	E0	P001 IBC03	PP93 B19	T7	TP4 TP6

Chapter 3.3

3.3.1 Add the following second sentence: "Where a special provision includes a requirement for package marking, the provisions of 5.2.1.2 (a) to (d) shall be met. If the required mark is in the form of specific wording indicated in quotation marks, such as "Damaged Lithium Batteries", the size of the mark shall be at least 12 mm, unless otherwise indicated in the special provision or elsewhere in these Regulations.".

SP 188 (f) Amend to read as follows:

"(f) Each package shall be marked with the appropriate lithium battery mark, as illustrated at 5.2.1.9;

NOTE: *The provisions concerning marking in special provision 188 of the eighteenth revised edition of the United Nations Recommendations on the Transport of Dangerous Goods, Model Regulations may continue to be applied until 31 December 2018.*

This requirement does not apply to:

(i) packages containing only button cell batteries installed in equipment (including circuit boards); and

(ii) packages containing no more than four cells or two batteries installed in equipment, where there are not more than two packages in the consignment.".

SP 188 (g) Delete.

SP 188 (h) and (i) Renumber as (g) and (h) respectively.

SP 188 Add the following paragraph at the end:

"A single cell battery as defined in Part III, sub-section 38.3.2.3 of the *Manual of Tests and Criteria* is considered a "cell" and shall be transported according to the requirements for "cells" for the purpose of this special provision.".

SP 204 At the end, add a new paragraph to read as follows:

"Articles containing smoke-producing substance(s) toxic by inhalation according to the criteria for Division 6.1 shall be labelled with a "TOXIC" subsidiary risk label (Model No 6.1, see 5.2.2.2.2), except that those manufactured before 31 December 2016 may be carried until 1 January 2019 without a "TOXIC" subsidiary label.".

SP 207 Delete "Polymeric beads and".

SP 225 After the second sentence, insert the following NOTE:

"***NOTE:*** *"Provisions applied in the country of manufacture" means the provisions applicable in the country of manufacture or those applicable in the country of use.".*

SP 225 At the end, insert the following NOTE:

"***NOTE*** *Pressure receptacles which contain gases for use in the above-mentioned extinguishers or for use in stationary fire-fighting installations shall meet the requirements in Chapter 6.2 and all requirements applicable to the relevant dangerous good when these pressure receptacles are transported separately.".*

SP 236 Amend to read as follows:

"236 Polyester resin kits consist of two components: a base material (either Class 3 or Division 4.1, packing group II or III) and an activator (organic peroxide). The organic peroxide shall be type D, E, or F, not requiring temperature control. The packing group shall be II or III, according to the criteria of either Class 3 or Division 4.1, as appropriate, applied to the base material. The quantity limit shown in column 7a of the Dangerous Goods List of Chapter 3.2 applies to the base material.".

SP 240 Amend as follows:

At the end of the first paragraph, insert the following sentence:

"Lithium batteries shall meet the requirements of 2.9.4, except when otherwise provided for in these Regulations (e.g. for prototype batteries and small production runs under special provision 310 or damaged batteries under special provision 376).".

In the second paragraph, replace "Examples of such vehicles are electrically-powered cars, motorcycles, scooters, three- and four-wheeled vehicles or motorcycles, e-bikes, wheel-chairs, lawn tractors, boats and aircraft." by "Examples of such vehicles are electrically-powered cars, motorcycles, scooters, three- and four-wheeled vehicles or motorcycles, trucks, locomotives, bicycles (pedal cycles with an electric motor) and other vehicles of this type (e.g. self-balancing vehicles or

vehicles not equipped with at least one seating position), wheel chairs, lawn tractors, self-propelled farming and construction equipment, boats and aircraft.".

At the end of the second paragraph, insert the following sentence:

"This includes vehicles transported in a packaging. In this case some parts of the vehicle may be detached from its frame to fit into the packaging.".

At the end, insert the following new paragraph:

"Vehicles may contain other dangerous goods than batteries (e.g. fire extinguishers, compressed gas accumulators or safety devices) required for their functioning or safe operation without being subject to any additional requirements for these other dangerous goods, unless otherwise specified in these Regulations.".

SP 244 Add the following paragraphs at the end:

"Before loading, these by-products shall be cooled to ambient temperature, unless they have been calcined to remove moisture. Cargo transport units containing bulk loads shall be adequately ventilated and protected against ingress of water throughout the journey.

Notwithstanding the provisions of 4.3.2.2, sheeted bulk containers (BK1) may be used for inland transport.".

SP 310 Amend to read as follows:

"310 The testing requirements in the Manual of Tests and Criteria, part III, sub-section 38.3 do not apply to production runs, consisting of not more than 100 cells and batteries, or to pre-production prototypes of cells and batteries when these prototypes are transported for testing when packaged in accordance with packing instruction P910 of 4.1.4.1

The transport document shall include the following statement: "Transport in accordance with special provision 310".

Damaged or defective cells, batteries, or cells and batteries contained in equipment shall be transported in accordance with special provision 376 and packaged in accordance with packing instructions P908 of 4.1.4.1 or LP904 of 4.1.4.3, as applicable.

Cells, batteries or cells and batteries contained in equipment transported for disposal or recycling may be packaged in accordance with special provision 377 and packing instruction P909 of 4.1.4.1.".

SP 312 Amend as follows:

Amend the first sentence to read:

"Vehicles powered by a fuel cell engine shall be consigned under the entries UN No. 3166 VEHICLE, FUEL CELL, FLAMMABLE GAS POWERED or UN No. 3166 VEHICLE, FUEL CELL, FLAMMABLE LIQUID POWERED, as appropriate.".

At the end, add a new paragraph to read as follows:

"Lithium batteries shall meet the requirements of 2.9.4, except when otherwise provided for in these Regulations (e.g. for prototype batteries and small production runs under special provision 310 or damaged batteries under special provision 376).".

SP 327 In the second sentence, insert "movement and" after "protected against".

SP 327 In the third sentence, replace "LP02" by "LP200".

SP 361 Amend sub-paragraph (e) to read as follows:

"(e) Capacitors manufactured after 31 December 2013, shall be marked with the energy storage capacity in Wh.".

SP 363 Amend to read as follows:

"363 (a) This entry applies to engines or machinery, powered by fuels classified as dangerous goods via internal combustion systems or fuel cells (e.g. combustion engines, generators, compressors, turbines, heating units, etc.), except those which are assigned under UN No. 3166 or UN No. 3363.

(b) Engines or machinery which are empty of liquid or gaseous fuels and which do not contain other dangerous goods, are not subject to these Regulations.

NOTE 1 *An engine or machinery is considered to be empty of liquid fuel when the liquid fuel tank has been drained and the engine or machinery cannot be operated due to a lack of fuel. Engine or machinery components such as fuel lines, fuel filters and injectors do not need to be cleaned, drained or purged to be considered empty of liquid fuels. In addition, the liquid fuel tank does not need to be cleaned or purged.*

NOTE 2 *An engine or machinery is considered to be empty of gaseous fuels when the gaseous fuel tanks are empty of liquid (for liquefied gases), the positive pressure in the tanks does not exceed 2 bar and the fuel shut-off or isolation valve is closed and secured.*

(c) Engines and machinery containing fuels meeting the classification criteria of Class 3, shall be consigned under the entries UN No. 3528 ENGINE, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED or UN No. 3528 ENGINE, FUEL CELL, FLAMMABLE LIQUID POWERED or UN No. 3528 MACHINERY, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED or UN No. 3528 MACHINERY, FUEL CELL, FLAMMABLE LIQUID POWERED, as appropriate.

(d) Engines and machinery containing fuels meeting the classification criteria of Division 2.1, shall be consigned under the entries UN No. 3529 ENGINE, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED or UN No. 3529 ENGINE, FUEL CELL, FLAMMABLE GAS POWERED or UN No. 3529 MACHINERY, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED or UN No. 3529 MACHINERY, FUEL CELL, FLAMMABLE GAS POWERED, as appropriate.

Engines and machinery powered by both a flammable gas and a flammable liquid shall be consigned under the appropriate UN No. 3529 entry.

(e) Engines and machinery containing liquid fuels meeting the classification criteria of 2.9.3 for environmentally hazardous substances and not meeting the classification criteria of any other Class or Division, shall be consigned under the entries UN No. 3530 ENGINE, INTERNAL COMBUSTION or UN No. 3530 MACHINERY, INTERNAL COMBUSTION, as appropriate.

(f) Engines or machinery may contain other dangerous goods than fuels (e.g. batteries, fire extinguishers, compressed gas accumulators or safety devices) required for their functioning or safe operation without being subject to any additional requirements for these other dangerous goods, unless otherwise specified in these Regulations. However, lithium batteries shall meet the requirements of 2.9.4, except when otherwise specified by these Regulations (e.g. for prototype batteries and small production runs under special provision 310 or damaged batteries under special provision 376).

(g) The engines or machinery are not subject to any other requirements of these Regulations if the following requirements are met:

(i) The engine or machinery, including the means of containment containing dangerous goods, shall be in compliance with the construction requirements specified by the competent authority;

(ii) Any valves or openings (e.g. venting devices) shall be closed during transport;

(iii) The engines or machinery shall be oriented to prevent inadvertent leakage of dangerous goods and secured by means capable of restraining the engines or machinery to prevent any movement during transport which would change the orientation or cause them to be damaged;

(iv) for UN No. 3528 and UN No. 3530:

Where the engine or machinery contains more than 60 l of liquid fuel and has a capacity of not more than 450 l, the labelling requirements of 5.2.2 shall apply.

Where the engine or machinery contains more than 60 l of liquid fuel and has a capacity of more than 450 l but not more than 3 000 l, it shall be labelled on two opposing sides in accordance with 5.2.2.

Where the engine or machinery contains more than 60 l of liquid fuel and has a capacity of more than 3 000 l, it shall be placarded on two opposing sides in accordance with 5.3.1.1.2;

(v) for UN No. 3529:

Where the fuel tank of the engine or machinery has a water capacity of not more than 450 l, the labelling requirements of 5.2.2 shall apply.

Where the fuel tank of the engine or machinery has a water capacity of more than 450 l but not more than 1 000 l, it shall be labelled on two opposing sides in accordance with 5.2.2.

Where the fuel tank of the engine or machinery has a water capacity of more than 1 000 l, it shall be placarded on two opposing sides in accordance with 5.3.1.1.2;

(vi) A transport document in accordance with 5.4 is required, except for UN No. 3528 and UN No. 3530, where a transport document is only required when the engine or machinery contains more than 60 l of liquid fuels. This transport document shall contain the following additional statement "Transport in accordance with special provision 363".".

SP 369 Amend the first paragraph to read as follows:

"In accordance with 2.0.3.2, this radioactive material in an excepted package possessing toxic and corrosive properties is classified in Division 6.1 with radioactive material and corrosivity subsidiary risks.".

SP 369 Amend the third paragraph to read as follows:

"In addition to the provisions applicable to the transport of Division 6.1 substances with a corrosivity subsidiary risk, the provisions of 5.1.3.2, 5.1.5.2.2, 5.1.5.4.1 (b), 7.1.8.5.1 to 7.1.8.5.4 and 7.1.8.6.1 shall apply.".

SP 370 In the second indent, replace "that is not too sensitive for acceptance into Class 1" with "that gives a positive result".

SP 372 Amend sub-paragraph (c) to read as follows:

"(c) Capacitors manufactured after 31 December 2015, shall be marked with the energy storage capacity in Wh.".

SP 373 (b) (i) and (c) (ii) Insert "or adsorbent" after "absorbent". Insert "or adsorb" after "absorb".

Add the following new special provisions:

"378 Radiation detectors containing this gas in non-refillable pressure receptacles not meeting the requirements of Chapter 6.2 and packing instruction P200 of 4.1.4.1 may be transported under this entry provided:

(a) The working pressure in each receptacle does not exceed 50 bar;

(b) The receptacle capacity does not exceed 12 litres;

(c) Each receptacle has a minimum burst pressure of at least 3 times the working pressure when a relief device is fitted and at least 4 times the working pressure when no relief device is fitted;

(d) Each receptacle is manufactured from material which will not fragment upon rupture;

(e) Each detector is manufactured under a registered quality assurance programme;

NOTE: *ISO 9001: 2008 may be used for this purpose.*

(f) Detectors are transported in strong outer packagings. The complete package shall be capable of withstanding a 1.2 metre drop test without breakage of the detector or rupture of the outer packaging. Equipment that includes a detector shall be packed in a strong outer packaging unless the detector is afforded equivalent protection by the equipment in which it is contained; and

(g) The transport document includes the following statement "Transport in accordance with special provision 378".

Radiation detectors, including detectors in radiation detection systems, are not subject to any other requirements of these Regulations if the detectors meet the requirements in (a) to (f) above and the capacity of detector receptacles does not exceed 50 ml.".

"379 Anhydrous ammonia adsorbed or absorbed on a solid contained in ammonia dispensing systems or receptacles intended to form part of such systems shall not be subject to the other provisions of these Regulations if the following conditions are observed:

(a) The adsorption or absorption presents the following properties:

(i) The pressure at a temperature of 20 °C in the receptacle is less than 0.6 bar;

(ii) The pressure at a temperature of 35 °C in the receptacle is less than 1 bar;

(iii) The pressure at a temperature of 85 °C in the receptacle is less than 12 bar.

(b) The adsorbent or absorbent material shall not have dangerous properties listed in Classes 1 to 8;

(c) The maximum contents of a receptacle shall be 10 kg of ammonia; and

(d) Receptacles containing adsorbed or absorbed ammonia shall meet the following conditions:

(i) Receptacles shall be made of a material compatible with ammonia as specified in ISO 11114-1:2012;

(ii) Receptacles and their means of closure shall be hermetically sealed and able to contain the generated ammonia;

(iii) Each receptacle shall be able to withstand the pressure generated at 85 °C with a volumetric expansion no greater than 0.1%;

(iv) Each receptacle shall be fitted with a device that allows for gas evacuation once pressure exceeds 15 bar without violent rupture, explosion or projection; and

(v) Each receptacle shall be able to withstand a pressure of 20 bar without leakage when the pressure relief device is deactivated.

When carried in an ammonia dispenser, the receptacles shall be connected to the dispenser in such a way that the assembly is guaranteed to have the same strength as a single receptacle.

The properties of mechanical strength mentioned in this special provision shall be tested using a prototype of a receptacle and/or dispenser filled to nominal capacity, by increasing the temperature until the specified pressures are reached.

The test results shall be documented, shall be traceable and shall be communicated to the relevant authorities upon request.".

"380 If a vehicle is powered by a flammable liquid and a flammable gas internal combustion engine, it shall be assigned to UN No. 3166 VEHICLE, FLAMMABLE GAS POWERED.".

"381 Large packagings conforming to the packing group III performance level used in accordance with packing instruction LP02 of 4.1.4.3, as prescribed in the eighteenth revised edition of the United Nations Recommendations on the Transport of Dangerous Goods, Model Regulations, may be used until 31 December 2022.".

"382 Polymeric beads may be made from polystyrene, poly (methyl methacrylate) or other polymeric material. When it can be demonstrated that no flammable vapour, resulting in a flammable atmosphere, is evolved according to test U1 (Test method for substances liable to evolve flammable vapours) of Part III, sub-section 38.4.4 of the Manual of Tests and Criteria, polymeric beads, expandable need not be classified under this UN number. This test should only be performed when de-classification of a substance is considered.".

"383 Table tennis balls manufactured from celluloid are not subject to these Regulations where the net mass of each table tennis ball does not exceed 3.0 g and the total net mass of table tennis balls does not exceed 500 g per package.".

"384 The label to be used is Model No 9A, see 5.2.2.2.2.

NOTE: *The Class 9 label (Model No 9) may continue to be used until 31 December 2018.*".

"385 This entry applies to vehicles powered by flammable liquid or gas internal combustion engines or fuel cells.

Hybrid electric vehicles powered by both an internal combustion engine and wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries, transported with the batteries installed shall be consigned under this entry. Vehicles powered by wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries, transported with the batteries installed, shall be consigned under the entry UN No. 3171 BATTERY-POWERED VEHICLE (see special provision 240).

For the purpose of this special provision, vehicles are self-propelled apparatus designed to carry one or more persons or goods. Examples of such vehicles are cars, motorcycles, trucks, locomotives, scooters, three- and four-wheeled vehicles or motorcycles, lawn tractors, self-propelled farming and construction equipment, boats and aircraft.

Dangerous goods such as batteries, air bags, fire extinguishers, compressed gas accumulators, safety devices and other integral components of the vehicle that are necessary for the operation of the vehicle or for the safety of its operator or passengers, shall be securely installed in the vehicle and are not otherwise subject to these Regulations However, lithium batteries shall meet the requirements of 2.9.4, except when otherwise specified by these Regulations (e.g. for prototype batteries and small production runs under special provision 310 or damaged batteries under special provision 376).".

"386 When substances are stabilized by temperature control, the provisions of 7.1.6 apply. When chemical stabilization is employed, the person offering the packaging, IBC or tank for transport shall ensure that the level of stabilization is sufficient to prevent the substance in the packaging, IBC or tank from dangerous polymerization at a bulk mean temperature of 50 °C, or, in the case of a portable tank, 45 °C. Where chemical stabilization becomes ineffective at lower temperatures within the anticipated duration of transport, temperature control is required. In making this determination factors to be taken into consideration include, but are not limited to, the capacity and geometry of the packaging, IBC or tank and the effect of any insulation present, the temperature of the substance when offered for transport, the duration of the journey and the ambient temperature conditions typically encountered in the journey (considering also the season of year), the effectiveness and other properties of the stabilizer employed, applicable operational controls imposed by regulation (e.g. requirements to protect from sources of heat, including other cargo carried at a temperature above ambient) and any other relevant factors.".

Chapter 3.4

3.4.7.1 Replace "marking" by "mark" wherever it appears (4 times).

3.4.7.2 At the end of the first sentence, replace "marking" by "mark".

3.4.8.1 Replace "marking" by "mark" wherever it appears (4 times).

3.4.8.2 At the end of the first sentence, replace "marking" by "mark".

3.4.9 Replace "marking" by "mark" (twice) and "markings" by "marks".

3.4.10 Replace "marking" by "mark".

3.4.11 Amend to read as follows:

"**3.4.11 Use of overpacks**

For an overpack containing dangerous goods packed in limited quantities, the following applies:

Unless the marks representative of all dangerous goods in an overpack are visible, the overpack shall be:

- marked with the word "OVERPACK". The lettering of the "OVERPACK" mark shall be at least 12 mm high; and
- marked with the marks required by this chapter.

Except for air transport, the other provisions of 5.1.2.1 apply only if other dangerous goods which are not packed in limited quantities are contained in the overpack and only in relation to these other dangerous goods.".

Chapter 3.5

3.5.2 (b) After the first sentence, amend the remainder of sub-paragraph (b) to read as follows:

"For liquid dangerous goods, the intermediate or outer packaging shall contain sufficient absorbent material to absorb the entire contents of the inner packagings. When placed in the intermediate packaging, the absorbent material may be the cushioning material. Dangerous goods shall not react dangerously with cushioning, absorbent material and packaging material or reduce the integrity or function of the materials. Regardless of its orientation, the package shall completely contain the contents in case of breakage or leakage;".

3.5.2 (e) Replace "markings" by "marks".

3.5.4.2 In the paragraph after the figure, replace "marking" by "mark".

3.5.4.3 Amend to read as follows:

"**3.5.4.3** ***Use of overpacks***

For an overpack containing dangerous goods packed in excepted quantities, the following applies:

Unless the marks representative of all dangerous goods in an overpack are visible, the overpack shall be:

- marked with the word "OVERPACK". The lettering of the "OVERPACK" mark shall be at least 12 mm high; and
- marked with the marks required by this chapter.

The other provisions of 5.1.2.1 apply only if other dangerous goods which are not packed in excepted quantities are contained in the overpack and only in relation to these other dangerous goods.".

Alphabetic index

Amend the Class and UN No. for the following entries to read:

ENGINE, FUEL CELL, FLAMMABLE GAS POWERED	2.1	3529
ENGINE, FUEL CELL, FLAMMABLE LIQUID POWERED	3	3528
ENGINE, INTERNAL COMBUSTION	9	3530

Amend the entry for "POLYESTER RESIN KIT" to read as follows:

POLYESTER RESIN KIT, liquid base material	3	3269
POLYESTER RESIN KIT, solid base material	4.1	3527

In the entry for ROCKET MOTORS, insert "1.4C" after "1.3C"and "0510" after "0186".

Add the following new entries in alphabetical order:

ENGINE, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED	3	3528
MACHINERY, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED	3	3528
MACHINERY, FUEL CELL, FLAMMABLE LIQUID POWERED	3	3528

ENGINE, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED	2.1	3529
MACHINERY, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED	2.1	3529
MACHINERY, FUEL CELL, FLAMMABLE GAS POWERED	2.1	3529
MACHINERY, INTERNAL COMBUSTION	9	3530
HALOGENATED MONOMETHYLDIPHENYLMETHANES, LIQUIDS	9	3151
HALOGENATED MONOMETHYLDIPHENYLMETHANES, SOLIDS	9	3152
Table Tennis Balls, see	4.1	2000

Chapter 4.1

4.1.1.5 In the second sentence, replace "markings" by "marks".

4.1.1.12 Amend the introductory sentence to read as follows: "Every packaging as specified in Chapter 6.1 intended to contain liquids shall successfully undergo a suitable leakproofness test. This test is part of a quality assurance program as stipulated in 6.1.1.4 which shows the capability of meeting the appropriate test level indicated in 6.1.5.4.3:".

4.1.1.18 Amend the heading to read as follows: "*Use of salvage packagings and large salvage packagings*".

4.1.1.18.1 In the first sentence, insert "and 6.6.5.1.9" after "6.1.5.1.11". Amend the second sentence to read as follows: "This does not prevent the use of a larger size packaging or large packaging of appropriate type and performance level and under the conditions of 4.1.1.18.2 and 4.1.1.18.3.".

4.1.1.19.1 In the Note, replace "markings" by "marks".

4.1.1.19.2 Add a second sentence to read as follows: "The maximum size of the placed pressure receptacle is limited to a water capacity of 1 000 litres.". Add a penultimate sentence to read as follows: "In this case the total sum of water capacities of the placed pressure receptacles shall not exceed 1 000 litres.".

4.1.2.4 At the end, before the sub-paragraphs, replace "marking" by "mark".

4.1.4.1 For packing instruction P001, add a new special packing provision "PP93" to read:

"PP93 For UN Nos. 3532 and 3534, packagings shall be designed and constructed to permit the release of gas or vapour to prevent a build-up of pressure that could rupture the packagings in the event of loss of stabilization.".

4.1.4.1 For packing instruction P002, add a new special packing provision "PP92" to read:

"PP92 For UN Nos. 3531 and 3533, packagings shall be designed and constructed to permit the release of gas or vapour to prevent a build-up of pressure that could rupture the packagings in the event of loss of stabilization.".

4.1.4.1, packing instructions P112 (c), P114 (b) and P406 In special packing provision PP48, add a new last sentence to read as follows: "Packagings of other material with a small amount of metal, for example metal closures or other metal fittings such as those mentioned in 6.1.4, are not considered metal packagings.".

4.1.4.1, packing instruction 137 In special packing provision PP70, replace "the package marked THIS SIDE UP" by "the package shall be marked in accordance with 5.2.1.7.1".

4.1.4.1. packing instruction P200 (2) Amend to read as follows:

"(2) The following three tables cover compressed gases (Table 1), liquefied and dissolved gases (Table 2) and substances not in Class 2 (Table 3). They provide:

(a) The UN number, name and description, and classification of the substance;

(b) The LC_{50} for toxic substances;

(c) The types of pressure receptacles authorised for the substance, shown by the letter "X";

(d) The maximum test period for periodic inspection of the pressure receptacles.

NOTE: *For pressure receptacles which make use of composite materials, the maximum test period shall be 5 years. The test period may be extended to that specified in Tables 1 and 2 (i.e. up to 10 years), if approved by the competent authority of the country of use.*

(e) The minimum test pressure of the pressure receptacles;

(f) The maximum working pressure of the pressure receptacles for compressed gases (where no value is given, the working pressure shall not exceed two thirds of the test pressure) or the maximum filling ratio(s) dependent on the test pressure(s) for liquefied and dissolved gases;

(g) Special packing provisions that are specific to a substance.".

4.1.4.1. packing instruction P200 (3) Insert a new sub-paragraph (e) to read as follows:

"(e) For liquefied gases charged with compressed gases, both components – the liquid phase and the compressed gas – have to be taken into consideration in the calculation of the internal pressure in the pressure receptacle.

The maximum mass of contents per litre of water capacity shall not exceed 0.95 times the density of the liquid phase at 50 °C; in addition, the liquid phase shall not completely fill the pressure receptacle at any temperature up to 60 °C.

When filled, the internal pressure at 65 °C shall not exceed the test pressure of the pressure receptacles. The vapour pressures and volumetric expansions of all substances in the pressure receptacles shall be considered. When experimental data is not available, the following steps shall be carried out:

(i) Calculation of the vapour pressure of the liquid component and of the partial pressure of the compressed gas at 15 °C (filling temperature);

(ii) Calculation of the volumetric expansion of the liquid phase resulting from the heating from 15 °C to 65 °C and calculation of the remaining volume for the gaseous phase;

(iii) Calculation of the partial pressure of the compressed gas at 65 °C considering the volumetric expansion of the liquid phase;

NOTE: *The compressibility factor of the compressed gas at 15 °C and 65 °C shall be considered.*

(iv) Calculation of the vapour pressure of the liquid component at 65 °C;

(v) The total pressure is the sum of the vapour pressure of the liquid component and the partial pressure of the compressed gas at 65 °C;

(vi) Consideration of the solubility of the compressed gas at 65 °C in the liquid phase;

The test pressure of the pressure receptacle shall not be less than the calculated total pressure minus 100 kPa (1bar).

If the solubility of the compressed gas in the liquid component is not known for the calculation, the test pressure can be calculated without taking the gas solubility (sub-paragraph (vi)) into account.".

4.1.4.1, packing instruction P200 Insert a new paragraph (4) to read as follows:

"(4) The filling of pressure receptacles shall be carried out by qualified staff using appropriate equipment and procedures.

The procedures should include checks of:

- The conformity of receptacles and accessories with these Regulations;
- Their compatibility with the product to be transported;
- The absence of damage which might affect safety;
- Compliance with the degree or pressure of filling, as appropriate;
- Marks and identification.

These requirements are deemed to be met if the following standards are applied:

ISO 10691: 2004	Gas cylinders – Refillable welded steel cylinders for liquified petroleum gas (LPG) – Procedures for checking before, during and after filling.
ISO 11372: 2011	Gas cylinders – Acetylene cylinders – Filling conditions and filling inspection
ISO 11755: 2005	Gas cylinders – Cylinder bundles for compressed and liquefied gases (excluding acetylene) – Inspection at time of filling
ISO 13088: 2011	Gas cylinders – Acetylene cylinder bundles – Filling conditions and filling inspection
ISO 24431:2006	Gas cylinders – Cylinders for compressed and liquefied gases (excluding acetylene) – Inspection at time of filling

".

4.1.4.1, packing instruction P200 Renumber existing paragraph (4) as (5) and amend this paragraph as follows:

In special provision p, in the two first paragraphs, replace "or ISO 3807-2:2000" by ", ISO 3807-2:2000 or ISO 3807:2013", twice. In the last paragraph, replace "conforming to ISO 3807-2:2000" by "fitted with a fusible plug".

In special provision u, replace "ISO 7866:1999" by "ISO 7866:2012 + Cor 1:2014".

4.1.4.1, packing instruction P200, Table 3 At the end, delete the entry for UN No. 2983.

4.1.4.1, packing instruction P205 (6) Replace "marking" by "mark".

4.1.4.1, packing instruction P206 (3) At the end add the following paragraph:

"For liquids charged with a compressed gas both components – the liquid phase and the compressed gas – have to be taken into consideration in the calculation of the internal pressure in the pressure receptacle. When experimental data is not available, the following steps shall be carried out:

(a) Calculation of the vapour pressure of the liquid component and of the partial pressure of the compressed gas at 15 °C (filling temperature);

(b) Calculation of the volumetric expansion of the liquid phase resulting from the heating from 15 °C to 65 °C and calculation of the remaining volume for the gaseous phase;

(c) Calculation of the partial pressure of the compressed gas at 65 °C considering the volumetric expansion of the liquid phase;

NOTE: *The compressibility factor of the compressed gas at 15 °C and 65 °C shall be considered.*

(d) Calculation of the vapour pressure of the liquid component at 65 °C;

(e) The total pressure is the sum of the vapour pressure of the liquid component and the partial pressure of the compressed gas at 65 °C;

(f) Consideration of the solubility of the compressed gas at 65 °C in the liquid phase.

The test pressure of the cylinders or pressure drums shall not be less than the calculated total pressure minus 100 kPa (1bar).

If the solubility of the compressed gas in the liquid component is not known for the calculation, the test pressure can be calculated without taking the gas solubility (sub-paragraph (f)) into account.".

4.1.4.1, packing instruction P207 In the last sentence before the special packing provision, insert the word "excessive" after "to prevent".

4.1.4.1, packing instruction P208 (1) Amend to read as follows:

"(1) The following packagings are authorized provided the general packing requirements of **4.1.6.1** are met:

(a) Cylinders constructed as specified in 6.2.2 and in accordance with ISO 11513:2011 or ISO 9809-1:2010; and

(b) Cylinders constructed before 1 January 2016 in accordance with 6.2.3 and a specification approved by the competent authorities of the countries of transport and use.".

4.1.4.1, packing instructions P403 and P410 Delete special packing provision "PP83" and insert "PP83 *Deleted*".

4.1.4.1, packing instruction P502: Amend special packing provision "PP28" to read as follows:

"PP28 For UN No. 1873, parts of packagings which are in direct contact with perchloric acid shall be constructed of glass or plastics.".

4.1.4.1, packing instruction P650 (10) Replace "markings" by "marks".

4.1.4.1, packing instruction P805 Renumber as "P603" and reorder accordingly.

4.1.4.1, packing instruction P906 (1) Amend to read as follows: "For liquids and solids containing or contaminated with PCBs, polyhalogenated biphenyls, polyhalogenated terphenyls or halogenated monomethyldiphenylmethanes: Packagings in accordance with P001 or P002, as appropriate.".

4.1.4.1, packing instruction P906 (2) (b) Amend the end of the first sentence to read as follows: "PCBs, polyhalogenated biphenyls, polyhalogenated terphenyls or halogenated monomethyldiphenylmethanes present in them.".

4.1.4.1, packing instruction P909 (3) Amend the beginning of the last sentence to read: "Equipment may also be…". Remainder unchanged.

4.1.4.1 Add the following new packing instructions:

P005	PACKING INSTRUCTION	P005
This packing instruction applies to UN Nos. 3528, 3529 and 3530.		
If the engine or machinery is constructed and designed so that the means of containment containing the dangerous goods affords adequate protection, an outer packaging is not required. Dangerous goods in engines or machinery shall otherwise be packed in outer packagings constructed of suitable material, and of adequate strength and design in relation to the packaging capacity and its intended use, and meeting the applicable requirements of 4.1.1.1, or they shall be fixed in such a way that they will not become loose during normal conditions of transport, e.g. in cradles or crates or other handling devices. In addition, the manner in which means of containment are contained within the engine or machinery, shall be such that under normal conditions of transport, damage to the means of containment containing the dangerous goods is prevented; and in the event of damage to the means of containment containing liquid dangerous goods, no leakage of the dangerous goods from the engine or machinery is possible (a leakproof liner may be used to satisfy this requirement). Means of containment containing dangerous goods shall be so installed, secured or cushioned as to prevent their breakage or leakage and so as to control their movement within the engine or machinery during normal conditions of transport. Cushioning material shall not react dangerously with the content of the means of containment. Any leakage of the contents shall not substantially impair the protective properties of the cushioning material.		
Additional requirement: Other dangerous goods (e.g. batteries, fire extinguishers, compressed gas accumulators or safety devices) required for the functioning or safe operation of the engine or machinery shall be securely mounted in the engine or machine.		

P412	PACKING INSTRUCTION	P412
This instruction applies to UN No. 3527		
The following combination packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met: (1) Outer packagings: Drums (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G); Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2) Jerricans (3A1, 3A2, 3B1, 3B2, 3H1, 3H2); (2) Inner packagings: (a) The activator (organic peroxide) shall have a maximum quantity of 125 ml per inner packaging if liquid, and 500 g per inner packaging if solid. (b) The base material and the activator shall be each separately packed in inner packagings. The components may be placed in the same outer packaging provided that they will not interact dangerously in the event of a leakage. Packagings shall conform to the packing group II or III performance level according to the criteria for Division 4.1 applied to the base material.		

P910	PACKING INSTRUCTION	P910

This instruction applies to UN Nos. 3090, 3091, 3480 and 3481 production runs consisting of not more than 100 cells and batteries and to pre-production prototypes of cells and batteries when these prototypes are transported for testing.

The following packagings are authorized provided that the general provisions of **4.1.1** and **4.1.3** are met:

(1) For cells and batteries, including when packed with equipment:

Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G);

Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);

Jerricans (3A2, 3B2, 3H2).

Packagings shall conform to the packing group II performance level and shall meet the following requirements:

(a) Batteries and cells, including equipment, of different sizes, shapes or masses shall be packaged in an outer packaging of a tested design type listed above provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested;

(b) Each cell or battery shall be individually packed in an inner packaging and placed inside an outer packaging;

(c) Each inner packaging shall be completely surrounded by sufficient non-combustible and non-conductive thermal insulation material to protect against a dangerous evolution of heat;

(d) Appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the cells or batteries within the package that may lead to damage and a dangerous condition during transport. Cushioning material that is non-combustible and non-conductive may be used to meet this requirement;

(e) Non-combustibility shall be assessed according to a standard recognized in the country where the packaging is designed or manufactured;

(f) A cell or battery with a net mass of more than 30 kg shall be limited to one cell or battery per outer packaging.

(2) For cells and batteries contained in equipment:

Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G);

Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);

Jerricans (3A2, 3B2, 3H2).

Packagings shall conform to the packing group II performance level and shall meet the following requirements:

(a) Equipment of different sizes, shapes or masses shall be packaged in an outer packaging of a tested design type listed above provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested;

(b) The equipment shall be constructed or packaged in such a manner as to prevent accidental operation during transport;

(c) Appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the equipment within the package that may lead to damage and a dangerous condition during transport. When cushioning material is used to meet this requirement it shall be non-combustible and non-conductive; and

(d) Non-combustibility shall be assessed according to a standard recognized in the country where the packaging is designed or manufactured.

P910	PACKING INSTRUCTION	P910

(3) The equipment or the batteries may be transported unpackaged under conditions specified by the competent authority. Additional conditions that may be considered in the approval process include, but are not limited to:

(a) The equipment or the battery shall be strong enough to withstand the shocks and loadings normally encountered during transport, including transshipment between cargo transport units and between cargo transport units and warehouses as well as any removal from a pallet for subsequent manual or mechanical handling; and

(b) The equipment or the battery shall be fixed in cradles or crates or other handling devices in such a way that it will not become loose during normal conditions of transport.

Additional requirements

The cells and batteries shall be protected against short circuit;

Protection against short circuits includes, but is not limited to,

- individual protection of the battery terminals,

- inner packaging to prevent contact between cells and batteries,

- batteries with recessed terminals designed to protect against short circuits, or

- the use of a non-conductive and non-combustible cushioning material to fill empty space between the cells or batteries in the packaging.

4.1.4.2, packing instruction IBC03 Add a new special packing provision "B19" to read:

"B19 For UN Nos. 3532 and 3534, IBCs shall be designed and constructed to permit the release of gas or vapour to prevent a build-up of pressure that could rupture the IBCs in the event of loss of stabilization.".

4.1.4.2, packing instruction IBC07 Add a new special packing provision "B18" to read:

"B18 For UN Nos. 3531 and 3533, IBCs shall be designed and constructed to permit the release of gas or vapour to prevent a build-up of pressure that could rupture the IBCs in the event of loss of stabilization.".

4.1.4.2, packing instruction IBC520 Add the following new entries:

UN No.	*Organic peroxide*	*Type of IBC*	*Maximum quantity (litres)*	*Control temperature*	*Emergency Temperature*
3109	tert-Butyl cumyl peroxide	31HA1	1000		
3119	1,1,3,3-Tetramethylbutyl peroxy-2-ethylhexanoate, not more than 67%, in diluent type A	31HA1	1000	+15 °C	+20 °C

4.1.4.2, packing instruction IBC520 For UN No. 3119, in the entry for "Di-(2-ethylhexyl) peroxydicarbonate, not more than 62%, stable dispersion, in water", add the following new row:

Type of IBC	*Maximum quantity (litres)*	*Control temperature*	*Emergency Temperature*
31HA1	1000	-20 °C	-10 °C

4.1.4.3, packing instruction LP02 Delete special packing instruction L2 and insert:

"L2 *Deleted*".

4.1.4.3, packing instruction LP101 In special packing instruction L1, replace "and 0502" by ", 0502 and 0510".

4.1.4.3 Add the following packing instruction:

LP200	PACKING INSTRUCTION	LP200
This instruction applies to UN No. 1950.		
The following large packagings are authorized for aerosols, provided that the general provisions of **4.1.1** and **4.1.3** are met: Rigid large packagings conforming to the packing group II performance level, made of: steel (50A); aluminium (50B); metal other than steel or aluminium (50N); rigid plastics (50H); natural wood (50C); plywood (50D); reconstituted wood (50F); rigid fibreboard (50G).		
Special packing provision: **L2** The large packagings shall be designed and constructed to prevent dangerous movement of the aerosols and inadvertent discharge during normal conditions of transport. For waste aerosols carried in accordance with special provision 327, the large packagings shall have a means of retaining any free liquid that might escape during transport, e.g. absorbent material. The large packagings shall be adequately ventilated to prevent the creation of a flammable atmosphere and the build-up of pressure.		

4.1.6.1.2 Replace "ISO 11114-2:2000" with "ISO 11114-2:2013".

4.1.6.1.8 In the penultimate paragraph, after "annex A of ISO 10297:2006", insert "or annex A of ISO 10297:2014".

4.1.6.1.12 (c) Replace "markings" by "marks".

4.1.6.1.13 (d) Replace "markings" by "marks".

4.1.8.4 Replace "marking" by "mark".

Chapter 4.2

4.2.1.13.14 Replace "marking" by "mark".

4.2.4.5.6 (c) Replace "markings" by "marks".

4.2.4.6 (d) Replace "markings" by "marks".

4.2.5.3 Delete TP23 and insert "TP23 *Deleted*".

Chapter 4.3

4.3.1.16.2 In the last sentence, insert "or the ingress of water" after "foreign substances".

Chapter 5.1

5.1.2.1 Amend to read as follows:

"5.1.2.1 Unless marks and labels representative of all dangerous goods in the overpack are visible, the overpack shall be:

— marked with the word "OVERPACK". The lettering of the "OVERPACK" mark shall be at least 12 mm high; and

— labelled and marked with the proper shipping name, UN number and other marks, as required for packages in Chapter 5.2, for each item of dangerous goods contained in the overpack.

Labelling of overpacks containing radioactive material shall be in accordance with 5.2.2.1.12.".

Existing Note remains with the following amendment: Replace "marking" by "mark".

5.1.2.2 In the second sentence, replace "marking" by "mark".

5.1.2.3 Replace "markings" by "marks" (twice).

Chapter 5.2

5.2.1.1 Replace "marking" by "mark" wherever it appears (2 times) and delete the Note.

5.2.1.2 In the introductory sentence and sub-paragraph (d), replace "markings" by "marks".

5.2.1.3 In the second sentence and the Note, replace "marking" by "mark".

5.2.1.5.1 In the second sentence replace "markings" by "marks".

5.2.1.5.7 Replace "marking" by "mark".

5.2.1.6.2 Replace "markings" by "marks"..

5.2.1.6.3 In the paragraph after the figure, replace "marking" by "mark" (twice).

Add a new 5.2.1.9 to read as follows:

"**5.2.1.9** ***Lithium battery mark***

5.2.1.9.1 Packages containing lithium cells or batteries prepared in accordance with special provision 188 shall be marked as shown in Figure 5.2.5.

5.2.1.9.2 The mark shall indicate the UN number, 'UN No. 3090' for lithium metal cells or batteries or 'UN No. 3480' for lithium ion cells or batteries. Where the lithium cells or batteries are contained in, or packed with, equipment, the UN number 'UN No. 3091' or 'UN No. 3481' as appropriate shall be indicated. Where a package contains lithium cells or batteries assigned to different UN numbers, all applicable UN numbers shall be indicated on one or more marks.

Figure 5.2.5

Lithium battery mark

* Place for UN number(s)

** Place for telephone number for additional information

The mark shall be in the form of a rectangle with hatched edging. The dimensions shall be a minimum of 120 mm wide x 110 mm high and the minimum width of the hatching shall be 5 mm. The symbol (group of batteries, one damaged and emitting flame, above the UN number for lithium ion or lithium metal batteries or cells) shall be black on white. The hatching shall be red. If the size of the package so requires, the dimensions/line thickness may be reduced to not less than 105 mm wide x 74 mm high. Where dimensions are not specified, all features shall be in approximate proportion to those shown.".

5.2.2.1 In the Note, replace "markings" by "marks".

5.2.2.1.6 (a) and (b) Replace "marking" by "mark".

5.2.2.1.12.1 In the penultimate sentence, replace "markings" by "marks".

5.2.2.2.1.1 Renumber Figure 5.2.5 as Figure 5.2.6.

5.2.2.2.1.1 Figure 5.2.6, (former 5.2.5), in the text for figure note **, insert "/symbol" after "text/number".

5.2.2.2.1.2 At the end, add a new Note to read as follows:

"***NOTE:*** *When the diameter of the cylinder is too small to permit the display of the reduced size labels on the non-cylindrical upper part of the cylinder, the reduced sized labels may be displayed on the cylindrical part.".*

5.2.2.2.1.3 In the second sentence, after "the hazard class (e.g. "flammable")" insert "or for label No. 9A the symbol".

5.2.2.2.1.5 At the end, add the following sentence: "For label 9A, no text other than the class mark shall be included in the bottom part of the label.".

5.2.2.2.2 Under "CLASS 9 Miscellaneous dangerous substances and articles, including environmentally hazardous substances", after the generic Class 9 label, add the following:

"

(No.9A)

Symbol (seven vertical black stripes in upper half; battery group, one broken and emitting flame in lower half): black;

Background: white;

Figure "9" underlined in bottom corner".

Chapter 5.3

5.3.1.1.4 At the end, add the following two new sentences to read as follows:

"If all compartments have to bear the same placards, these placards need to be displayed only once along each side of the cargo transport unit. For portable tanks with a capacity of not more than 3 000 litres and with an available surface area insufficient to affix the prescribed placards, placards may be replaced by labels conforming to 5.2.2.2 to be affixed on two opposite sides of the portable tank.".

5.3.2.1.2 (b) At the end, add a new sentence to read as follows: "For portable tanks with a capacity of not more than 3 000 litres and with an available surface area insufficient to affix the prescribed placards, the UN number may be displayed on an orange rectangular panel of appropriately reduced size on the external surface of the tank in characters not less than 25 mm high.".

5.3.2.2 In the second paragraph, replace "marking" by "mark" and insert a new fourth sentence to read as follows: "For portable tanks with a capacity of not more than 3 000 litres and with an available surface area insufficient to affix the prescribed marks, the minimum dimensions of the sides may be reduced to 100 mm.".

5.3.2.3.2 At the end, add a new sentence to read as follows: "For portable tanks with a capacity of not more than 3 000 litres and with an available surface area insufficient to affix the prescribed marks, the minimum dimensions may be reduced to 100 mm x 100 mm.".

Chapter 5.4

Insert a new 5.4.1.5.11 to read as follows:

"5.4.1.5.11 *Classification where new data is available (see 2.0.0.2)*

For transport in accordance with 2.0.0.2, a statement to this effect shall be included in the transport document, as follows "Classified in accordance with 2.0.0.2"."

Insert a new 5.4.1.5.12 to read as follows:

"5.4.1.5.12 *Transport of UN Nos. 3528, 3529 and 3530*

For transport of UN Nos. 3528, 3529 and 3530, the transport document shall contain the following additional statement "Transport in accordance with special provision 363"."

Chapter 5.5

5.5.2.3.2 In the paragraph after the figure, replace "marking" by "mark" (twice).

5.5.3.4.2 Replace "markings" by "marks".

5.5.3.6.2 In the last paragraph before the Note, replace "marking" by "mark".

Chapter 6.1

6.1.1.3 Amend the introductory sentence to read as follows: "Every packaging intended to contain liquids shall successfully undergo a suitable leakproofness test. This test is part of a quality assurance programme as stipulated in 6.1.1.4 which shows the capability of meeting the appropriate test level indicated in 6.1.5.4.3:".

6.1.3 In Note 1, amend the beginning to read as follows: "*The marks indicate that the packaging which bears them correspond to...*". In the second sentence, replace "mark does" by "marks do". In Note 2, replace "marking is" by "marks are" (twice). In Note 3, replace "marking does" by "marks do". In the second sentence, replace "marking" by "mark".

6.1.3.1 In the first paragraph, replace "markings" by "marks" (twice). In the heading of sub-paragraphs and in (e), replace "marking" by "marks". In the figure note in (e), replace "marking" by "mark".

6.1.3.2 In the first sentence replace "markings" by "marks".

6.1.3.3 In the last sentence replace "markings" by "marks".

6.1.3.4 Replace "markings" by "marks" (twice).

6.1.3.5 Replace "markings" by "marks".

6.1.3.6 Replace "mark" by "marks".

6.1.3.7 At the beginning, replace "Marking" by "Marks" and "elements of the marking" by "mark". In the second paragraph, amend the end to read as follows: "...still enable the other marks required in 6.1.3.1 to be correctly identified.".

6.1.3.8 In the introductory sentence, amend the end to read as follows: "...in sequence, durable marks showing:".

6.1.3.9 Replace "markings" by "marks" (twice).

6.1.3.10 In the heading, replace "of markings for" by "for marking".

6.1.3.11 In the heading, replace "of markings for" by "for marking".

6.1.3.12 In the heading, replace "of markings for" by "for marking" and in the Note "markings" by "marking".

6.1.5.1.6 In the NOTE, replace "assembling" by "using". Add a new last sentence to read as follows: "These conditions do not limit the use of inner packagings when applying 6.1.5.1.7.".

6.1.5.5.4 In the third sentence, replace "marking" by "mark".

Chapter 6.2

6.2.1.1.2 Replace "those that are marked with a UN certification marking" by "those that bear "UN" certification marks"

6.2.1.1.9 In the introductory sentence, after "and testing specified by" insert "a standard or technical code recognised by".

6.2.1.5.1 (g) Amend the text before the Note to read as follows:

"(g) A hydraulic pressure test. Pressure receptacles shall meet the acceptance criteria specified in the design and construction technical standard or technical code:".

6.2.1.5.1 (i) Replace "markings" by "marks".

6.2.1.6.1 (a) Replace "markings" by "marks".

6.2.2.1.1 After the entry for ISO 9809-3:2010 insert a new entry to read as follows:

ISO 9809-4:2014	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 4: Stainless steel cylinders with an Rm value of less than 1 100 MPa	Until further notice

6.2.2.1.1 In the table, for ISO 7866:1999, in the column "Applicable for manufacture", replace "Until further notice" with "Until 31 December 2020".

After the entry for ISO 7866:1999, insert a new entry to read as follows:

ISO ISO 7866: 2012+ Cor 1:2014	Gas cylinders – Refillable seamless aluminium alloy gas cylinders – Design, construction and testing ***NOTE:*** *Aluminium alloy 6351A or equivalent shall not be used*	Until further notice

6.2.2.1.1 At the end of the table, replace the three last entries (corresponding to standards "ISO 11119-1:2002", "ISO 11119-2:2002" and "ISO 11119-3:2002") with the following entries:

ISO 11119-1:2002	Gas cylinders of composite construction – Specification and test methods – Part 1: Hoop wrapped composite gas cylinders	Until 31 December 2020
ISO 11119-1:2012	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 1: Hoop wrapped fibre reinforced composite gas cylinders and tubes up to 450 l	Until further notice
ISO 11119-2:2002	Gas cylinders of composite construction – Specification and test methods – Part 2: Fully wrapped fibre reinforced composite gas cylinders with load-sharing metal liners	Until 31 December 2020
ISO 11119-2:2012 + Amd 1:2014	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 l with load-sharing metal liners	Until further notice

ISO 11119-3:2002	Gas cylinders of composite construction – Specification and test methods – Part 3: Fully wrapped fibre reinforced composite gas cylinders with non-load-sharing metallic or non-metallic liners	Until 31 December 2020
ISO 11119-3:2013	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 3: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 l with non-load-sharing metallic or non-metallic liners	Until further notice

6.2.2.1.1, Note 1 Replace "unlimited service life" with "a design life of not less than 15 years.".

6.2.2.1.1 Amend Note 2 to read as follows:

"***NOTE 2:*** *Composite cylinders with a design life longer than 15 years shall not be filled after 15 years from the date of manufacture, unless the design has successfully passed a service life test programme. The programme shall be part of the initial design type approval and shall specify inspections and tests to demonstrate that cylinders manufactured accordingly remain safe to the end of their design life. The service life test programme and the results shall be approved by the competent authority of the country of approval that is responsible for the initial approval of the cylinder design. The service life of a composite cylinder shall not be extended beyond its initial approved design life.*".

6.2.2.1.2 After the entry for standard "ISO 11120:1999", add the following new entries:

ISO 11119-1:2012	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 1: Hoop wrapped fibre reinforced composite gas cylinders and tubes up to 450 l	Until further notice
ISO 11119-2:2012 + Amd 1:2014	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 l with load-sharing metal liners	Until further notice
ISO 11119-3:2013	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 3: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 l with non-load-sharing metallic or non-metallic liners	Until further notice

6.2.2.1.2 Insert a new last row in the table in 6.2.2.1.2 to read as follows:

ISO 11515: 2013	Gas cylinders – Refillable composite reinforced tubes of water capacity between 450 L and 3 000 L – Design, construction and testing	Until further notice

6.2.2.1.2 Add the following NOTES after the table:

"***NOTE 1:*** *In the above referenced standards composite tubes shall be designed for a design life of not less than 15 years.*

NOTE 2: *Composite tubes with a design life longer than 15 years shall not be filled after 15 years from the date of manufacture, unless the design has successfully passed a service life test programme. The programme shall be part of the initial design type* approval *and shall specify inspections and tests to demonstrate that tubes manufactured accordingly remain safe to the end of their design life. The service life test programme and the results shall be approved by the competent authority of the country of approval that is responsible for the initial approval of the tube design. The service life of a composite tube shall not be extended beyond its initial approved design life.*".

6.2.2.1.3 In the table, for standards "ISO 3807-1:2000" and "ISO 3807-2:2000", amend the text in column "Applicable for manufacture" to read "Until 31 December 2020". After these standards, add the following new row:

ISO 3807:2013	Gas cylinders – Acetylene cylinders – Basic requirements and type testing	Until further notice

6.2.2.2 In the table, replace the entry for "ISO 11114-2:2000" with the following entry:

ISO 11114-2:2013	Gas cylinders – Compatibility of cylinder and valve materials with gas contents – Part 2: Non-metallic materials

6.2.2.3 In the table, for ISO 10297:2006, in the column "Applicable for manufacture", replace "Until further notice" with "Until 31 December 2020".

After the entry for ISO 10297:2006, insert a new entry to read as follows:

ISO 10297:2014	Gas cylinders – Cylinder valves – Specification and type testing	Until further notice

6.2.2.4 In the table, for ISO 10462: 2005, replace "Until further notice" by "Until 31 December 2018".

6.2.2.4 In the table, after ISO 10462: 2005, insert a new row to read as follows:

ISO 10462:2013	Gas cylinders – Acetylene cylinders – Periodic inspection and maintenance.	Until further notice

6.2.2.5.2.1 Replace "marking" by "marks".

6.2.2.5.5 In the fourth paragraph, second sentence, replace "marking" by "marks". In the third sentence, replace "certification marking" by "certification marks"

6.2.2.6.2.1 In the last sentence, replace "marking" by "marks"

6.2.2.6.5 In the first paragraph, replace "marking" by "marks" (twice).

6.2.2.7.4 Insert the following new sub-paragraphs and note at the end:

"(q) For composite cylinders and tubes having a limited design life, the letters "FINAL" followed by the design life shown as the year (four digits) followed by the month (two digits) separated by a slash (i.e. "/").

(r) For composite cylinders and tubes having a limited design life greater than 15 years and for composite cylinders and tubes having non-limited design life, the letters "SERVICE" followed by the date 15 years from the date of manufacture (initial inspection) shown as the year (four digits) followed by the month (two digits) separated by a slash (i.e. "/").

NOTE: *Once the initial design type has passed the service life test programme requirements in accordance with 6.2.2.1.1 NOTE 2 or 6.2.2.1.2 NOTE 2, future production no longer requires this initial service life mark. The initial service life mark shall be made unreadable on cylinders and tubes of a design type that has met the service life test programme requirements.".*

6.2.2.7.5 Add the following text at the end of the first indent: "…except for the marks described in 6.2.2.7.4 (q) and (r) which shall be adjacent to the periodic inspection and test marks of 6.2.2.7.7".

6.2.2.7.7 (a) In the second sentence, replace "marking" by "mark".

6.2.2.7.5 In the sentence after the sub-paragraphs, amend the end to read as follows: "...example of marking a cylinder.".

6.2.2.8.3 In the Note, amend the end to read as follows: "...substitute a label for these permanent marks.".

6.2.2.9.4 (a) In the second sentence, replace "marking" by "mark".

Chapter 6.3

6.3.4 In Note 1, amend the beginning to read as follows: "*The marks indicate that the packaging which bears them correspond to...*". In Note 2, replace "marking is" by "marks are". In Note 3, replace "marking does" by "marks do".

6.3.4.1 Replace "markings" by "marks" (twice).

6.3.4.2 (g) Replace "marking" by "mark".

6.3.4.3 At the beginning, replace "Marking" by "Marks" and "element of the marking" by "mark". In the second paragraph, amend the end to read as follows: "...still enable the marks required in 6.3.4.1 to be correctly identified.".

6.3.5.1.6 (g) Replace "markings" by "marks".

Chapter 6.4

6.4.23.12 (a) In the first sentence, replace "identification marking" by "identification marks".

Chapter 6.5

6.5.2.1.1 In the first paragraph, replace "markings" by "marks".

6.5.2.1.1 (a) Replace "marking is stamped" by "marks are stamped".

6.5.2.1.1 In the last paragraph, after the sub-paragraphs, replace "Marking" by "Mark" and "element of the marking" by "mark". Amend the text after sub-paragraph (h) to read:

"The primary marks required above shall be applied in the sequence of the sub-paragraphs below. The marks required by 6.5.2.2 and any further mark authorized by a competent authority shall still enable the primary marks to be correctly identified.

Each mark applied in accordance with (a) to (h) and with 6.5.2.2 shall be clearly separated, e.g. by a slash or space, so as to be easily identifiable.".

6.5.2.1.2 In the heading, replace "markings" by "marking".

6.5.2.2.1 Replace "markings" by "marks". In the table, in the heading of the first column, replace "marking" by "marks" and in table note b, replace "marking" by "mark".

6.5.2.2.3 Replace "markings" by "marks".

6.5.2.2.4 Amend as follows:

Amend the beginning of the first sentence to read as follows: "Inner receptacles that are of composite IBC design type shall be identified by the application of the marks...", remainder unchanged.

In the first paragraph, second sentence, replace "marking" by "marks". In the second paragraph, replace "marking" by "marks" and "marking" by "mark".

Renumber the existing Note as Note 1. Add a new Note 2 to read as follows:

"***NOTE 2:*** *The date of manufacture of the inner receptacle may be different from the marked date of manufacture (see 6.5.2.1), repair (see 6.5.4.5.3) or remanufacture (see 6.5.2.4) of the composite IBC.*"

6.5.2.3 Replace "marking indicates" by "marks indicate".

6.5.2.4 Replace "marking" by "marks" and "markings" by "marks"

6.5.4.4.1(a) (i) Replace "marking" by "marks".

6.5.4.4.2 Amend the introductory sentence to read as follows:

"6.5.4.4.2 Every metal, rigid plastics and composite IBC for liquids, or for solids which are filled or discharged under pressure, shall undergo a suitable leakproofness test. This test is part of a quality assurance programme as stipulated in 6.5.4.1 which shows the capability of meeting the appropriate test level indicated in 6.5.6.7.3:".

6.5.4.5.3 Replace "marking" by "marks".

Chapter 6.6

6.6.3.1 In the first paragraph, replace "markings" by "marks". In sub-paragraph (a), replace "marking is" by "marks are". In the sentences after the sub-paragraphs, replace "marking" by "mark", "element of the marking" by "mark" and delete the Note.

6.6.3.2 In the heading, replace "the marking" by "marking".

Chapter 6.7

6.7.2.19.8 (a) and 6.7.3.15.8 (a) Add a new last sentence to read as follows:

"The wall thickness shall be verified by appropriate measurement if this inspection indicates a reduction of wall thickness:".

6.7.2.19.8 (g) Replace "markings" by "marks".

Figure 6.7.2.20.1 Amend the heading to read "Example of a plate for marking".

6.7.3.15.8 (f) Replace "markings" by "marks".

Figure 6.7.3.16.1 Amend the heading to read "Example of a plate for marking".

6.7.4.14.9 (e) Replace "markings" by "marks".

Figure 6.7.4.15.1 Amend the heading to read "Example of a plate for marking".

6.7.5.2.4 (a) Replace "ISO 11114-2:2000" with "ISO 11114-2:2013".

6.7.5.12.6 (e) Replace "markings" by "marks".

Figure 6.7.5.13.1 Amend the heading to read "Example of a plate for marking".

6.8.5.5.1 In the first paragraph, replace "markings" by "marks". In the last paragraph, replace "Marking" by "Marks" and "element of the marking" by "mark".

Chapter 7.1

7.1.3.2.3 Insert the phrase", ammonium nitrate emulsion or suspension or gel (UN No. 3375)" after "(UN Nos. 1942 and 2067)".

7.1.6.1 Amend to read as follows:

"7.1.6.1 These provisions apply to the transport of substances for which:

(a) The proper shipping name as indicated in column 2 of the Dangerous Goods List of Chapter 3.2 or according to 3.1.2.6 contains the word "STABILIZED"; and

(b) The SADT or the SAPT[1] determined for the substance (with or without chemical stabilization) as offered for transport is:

(i) 50 °C or less for packagings and IBCs; or

(ii) 45 °C or less for portable tanks.".

Footnote [1] reads as follows: "[1] *The self-accelerating polymerization temperature (SAPT) shall be determined in accordance with the Manual of Tests and Criteria. The SADT tests in Section 28, Series H as appropriate may be equally applied to determine a self-accelerating polymerization temperature* ".

7.1.6.2 At the end, add: ", except that the term "SADT" as used in these paragraphs is understood to include also "SAPT" when the substance concerned reacts by polymerization".

7.1.6.4 Delete.

7.1.6.5 Renumber as 7.1.6.4.

7.1.9.2 Replace "markings" by "marks".

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Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals

Report of the Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals on its seventh session

held in Geneva on 12 December 2014

Addendum

Annex II

Amendments to the 5th revised edition of the United Nations Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria (ST/SG/AC.10/11/Rev.5)

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Section 1

1.1.2 Add the following new sentence at the end:

"Examples which may be listed within various test procedures are for illustrative purposes and are provided for guidance only.".

(Reference documents: ST/SG/AC.10/C.3/2014/37 and informal document INF.61/Add.2 of the forty-fifth session)

1.1.3 Add a new section 1.1.3 to read as follows:

"1.1.3 In situations where the proper classification of substances and articles of certain Hazard Classes or Divisions for transport is the responsibility of the Competent Authority, it is normal and accepted practice that due consideration will be given to testing or classification results of other Competent Authorities when provided.".

(Reference document: ST/SG/AC.10/C.3/86/Add.1)

Part I

Section 10

Figures 10.3 and 10.9 Amend as follows:

Figure 10.3: PROCEDURE FOR ASSIGNMENT TO A DIVISION OF CLASS 1

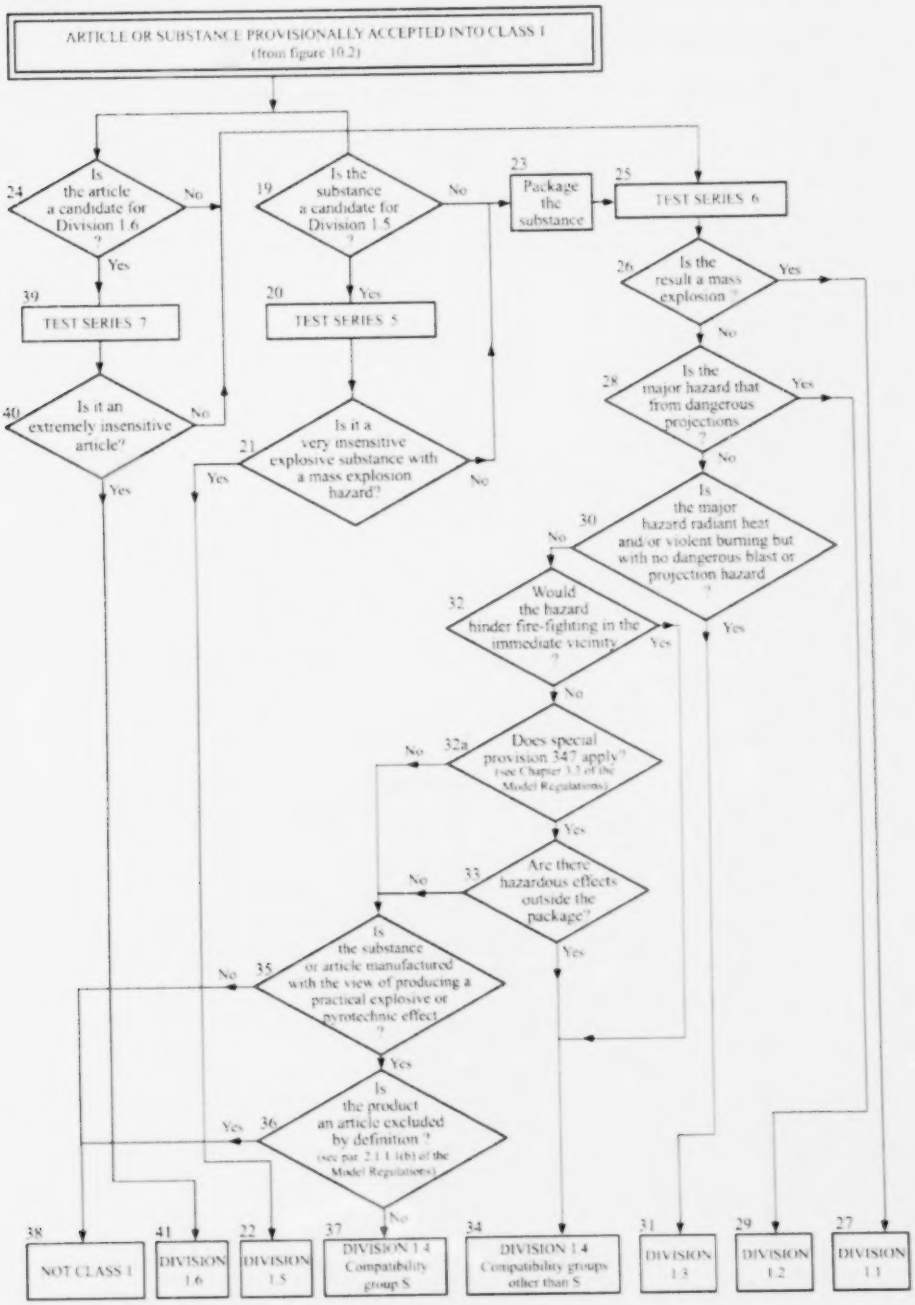
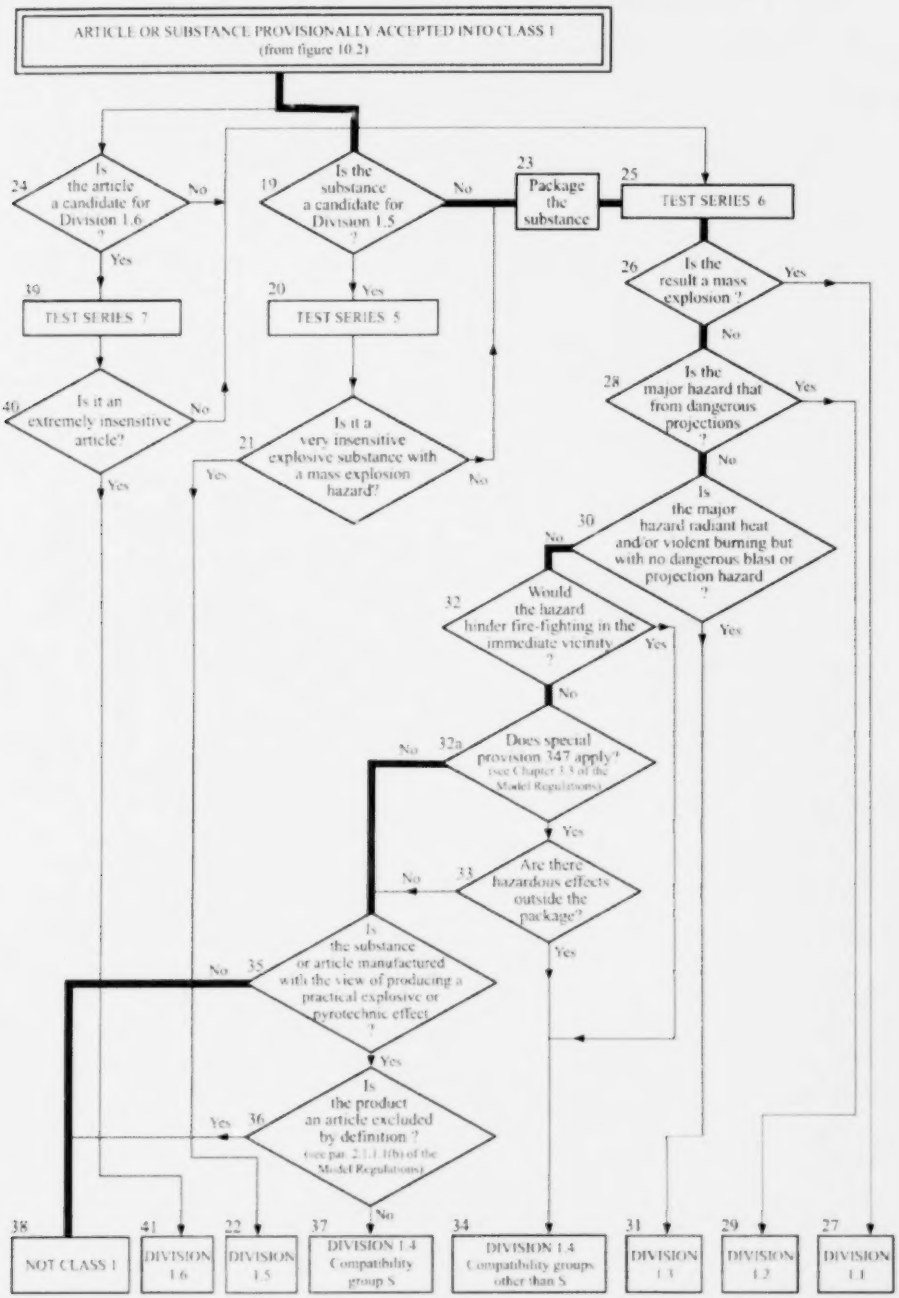

ARTICLE OR SUBSTANCE PROVISIONALLY ACCEPTED INTO CLASS 1
(from figure 10.2)
24 Is the article a candidate for Division 1.6 ?
No
Yes
19 Is the substance a candidate for Division 1.5 ?
No
Yes
23 Package the substance
25 TEST SERIES 6
26 Is the result a mass explosion ?
Yes
No
39 TEST SERIES 7
20 TEST SERIES 5
28 Is the major hazard that from dangerous projections ?
Yes
No
40 Is it an extremely insensitive article?
No
Yes
21 Is it a very insensitive explosive substance with a mass explosion hazard?
Yes
No
30 Is the major hazard radiant heat and/or violent burning but with no dangerous blast or projection hazard ?
No
Yes
32 Would the hazard hinder fire-fighting in the immediate vicinity ?
Yes
No
32a Does special provision 347 apply? (see Chapter 3.3 of the Model Regulations)
No
Yes
33 Are there hazardous effects outside the package?
No
Yes
35 Is the substance or article manufactured with the view of producing a practical explosive or pyrotechnic effect ?
No
Yes
36 Is the product an article excluded by definition ? (see par. 2.1.1.1(b) of the Model Regulations)
Yes
No
38 NOT CLASS 1
41 DIVISION 1.6
22 DIVISION 1.5
37 DIVISION 1.4 Compatibility group S
34 DIVISION 1.4 Compatibility groups other than S
31 DIVISION 1.3
29 DIVISION 1.2
27 DIVISION 1.1

Figure 10.9: PROCEDURE FOR EXEMPTION OF MUSK XYLENE FROM CLASS 1


ARTICLE OR SUBSTANCE PROVISIONALLY ACCEPTED INTO CLASS 1 (from figure 10.2)
24 Is the article a candidate for Division 1.6 ?
No
Yes
19 Is the substance a candidate for Division 1.5 ?
No
Yes
23 Package the substance
25 TEST SERIES 6
39 TEST SERIES 7
20 TEST SERIES 5
26 Is the result a mass explosion ?
Yes
No
40 Is it an extremely insensitive article?
No
Yes
21 Is it a very insensitive explosive substance with a mass explosion hazard?
Yes
No
28 Is the major hazard that from dangerous projections ?
Yes
No
30 Is the major hazard radiant heat and/or violent burning but with no dangerous blast or projection hazard ?
No
Yes
32 Would the hazard hinder fire-fighting in the immediate vicinity ?
Yes
No
32a Does special provision 347 apply? (see Chapter 3.3 of the Model Regulations)
No
Yes
33 Are there hazardous effects outside the package?
No
Yes
35 Is the substance or article manufactured with the view of producing a practical explosive or pyrotechnic effect ?
No
Yes
36 Is the product an article excluded by definition ? (see par. 2.1.1.1(b) of the Model Regulations)
Yes
No
38 NOT CLASS 1
41 DIVISION 1.6
22 DIVISION 1.5
37 DIVISION 1.4 Compatibility group S
34 DIVISION 1.4 Compatibility groups other than S
31 DIVISION 1.3
29 DIVISION 1.2
27 DIVISION 1.1

(Reference documents: ST/SG/AC.10/C.3/2014/4 and informal document INF.61/Add.2 of the forty-fifth session)

Consequential amendments:

Figure 10.8 *In 6.2, replace "box 35" by "box 32a". After 6.2, insert new lines to read as follows:*

"7. Box 32a : Does special provision 347apply?

7.1. Anwser : No

7.2. Exit : Go to box 35"

Renumber existing lines 7 and 8 accordingly.

10.4.2.5 In the last paragraph, insert "of ANEs" after "the suitability" and "portable" before "tanks".

(Reference documents: ST/SG/AC.10/C.3/2014/11 and informal document INF.61/Add.2 of the forty-fifth session)

10.4.3.4 Amend as follows:

In the first sentence, insert "normally" after "and 6 (d) are". In the second sentence, insert "follow this order or to" after "necessary to".

Third and fourth sentences become new sub-paragraphs (a) and (b) respectively. At the end of both add the following phrase: ", (see also section 10.4.3.4.(d)):".

Former sub-paragraphs (a) and (b) become indents (i) and (ii) under new sub-paragraph (b).

Next two sentences after (i) and (ii), former sub-paragraphs (a) and (b), become sub-paragraphs (c) and (d) respectively. At the end of (d) insert a new sentence to read as follows: "When testing articles to which special provision 347 applies, test type 6 (d) may be performed first. If the results of test type 6 (d) indicate that a 1.4S classification is appropriate, then test types 6 (a) and 6 (b) may be waived.".

Delete the last sentence, starting with "The results of test series 6 (c)…".

(Reference documents: ST/SG/AC.10/C.3/2014/4 as amended and informal document INF.61/Add.2 of the forty-fifth session)

Section 11

11.1.1 In the first sentence, delete "national and international definitions of an explosive substance and".

(Reference documents: informal document INF.61/Add.2 of the forty-fifth session)

11.3.2 At the end insert ", if known".

(Reference documents: informal document INF.61/Add.2 of the forty-fifth session)

11.3.5 Insert ""Low" or" after "F.1 or F.2 or F.3 test is".

(Reference documents: informal document INF.61/Add.2 of the forty-fifth session)

11.4.1.2.1 Amend as follows:

In the second sentence, delete "cold drawn" and replace "4.0 ± 0.1" by "4".

In the fourth sentence, replace "two layers of 0.08 mm thick polythene" by "a plastics", insert "tightly" before "in place" and delete the remainder of the sentence after "in place".

Amend the fifth and sixth sentences to read as follows: "The plastics sheet shall be compatible with the substance under test. The booster charge consists of 160 g RDX/wax (95/5) or PETN/TNT that has a minimum of 50% PETN in the mixture, 50 ± 1 mm in diameter with a density of 1 600 ± 50 kg/m^3.".

In the seventh sentence, replace "RDX/wax charge" by "charges".

In the eighth sentence, replace "3.2 ± 0.2" by "3" and "is mounted" by "may be mounted".

(Reference documents: ST/SG/AC.10/C.3/2014/6 and informal document INF.61/Add.2 of the forty-fifth session)

11.4.1.3.1 Delete the last sentence.

(Reference documents: informal document INF.61/Add.2 of the forty-fifth session)

11.4.1.4 In the first sentence, replace "and" by "or". Amend the end of the sentence after the indents to read as follows: "substance is considered not to be able to propagate a detonation".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

11.6.1.2.2 In the third sentence, after "lead washer" insert "or a washer of a suitable deformable material (for example, polyoxymethylene)".

(Reference documents: ST/SG/AC.10/C.3/2014/6 and informal document INF.61/Add.2 of the forty-fifth session)

Section 12

12.3.2 At the end insert ", if known".

(Reference documents: informal document INF.61/Add.2 of the forty-fifth session)

12.3.4 Insert ""Low" or" after "F.1 or F.2 or F.3 test is".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

12.4.1.2 Amend as follows:

In the second sentence, delete "cold drawn" and replace "4.0 ± 0.1" by "4".

In the fourth sentence, replace "two layers of 0.08 mm thick polythene" by "a plastics", insert "tightly" before "in place" and delete the remainder of the sentence after "in place".

Amend the fifth and sixth sentences to read as follows: "The plastics sheet shall be compatible with the substance under test. The booster charge consists of 160 g RDX/wax (95/5) or PETN/TNT that has a minimum of 50% PETN in the mixture, 50 ± 1 mm in diameter with a density of 1 600 ± 50 kg/m^3.".

In the seventh sentence, replace "RDX/wax charge" by "charges".

In the eighth sentence, replace "3.2 ± 0.2" by "3" and "is mounted" by "may be mounted".

(Reference documents: ST/SG/AC.10/C.3/2014/6, informal document INF.61/Add.2 of the forty-fifth session)

12.4.1.3.1 Delete the last sentence.

(Reference documents: informal document INF.61/Add.2 of the forty-fifth session)

12.4.1.4 In the first sentence, replace "and" by "or". Amend the end of the sentence after the indents to read as follows: "substance is considered to be not sensitive to detonative shock.".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

12.6.1.2.2 In the third sentence, after "lead washer" insert "or a washer of a suitable deformable material (for example, polyoxymethylene)".

(Reference documents: ST/SG/AC.10/C.3/2014/6 and informal document INF.61/Add.2 of the forty-fifth session)

Section 13

13.2, Table 13.1 Renumber existing "3 (c)" as "3 (c) (i)". Add the following new entries in the corresponding order:

Test code	Name of Test	Section
3 (a) (vii)	Modified Bureau of Mines impact machine test	13.4.7
3 (b) (iv)	ABL friction machine test	13.5.4
3 (c) (ii)	SBAT thermal stability test at 75 °C	13.6.2

Consequential corrections:

In the table of contents, for 13.5.3, replace "Test 3 (b) (iv)" by "Test 3 (b) (iii)".

13.5.3 In the title, replace "Test 3 (b) (iv)" by "Test 3 (b) (iii)".

(Reference documents: ST/SG/AC.10/C.3/2014/48, -2014/51, -2014/52 and informal document INF.61/Add.2 of the forty-fifth session)

13.4 Add a new subsection 13.4.7 to read as follows:

"13.4.7 Test 3 (a) (vii): Modified Bureau of Mines impact machine test

13.4.7.1 *Introduction*

This test is used to measure the sensitiveness of the substance to drop-mass impact and to determine if the substance is too dangerous to transport in the form tested. The test substance is subjected to a vertical impact force through an intermediate hammer via a drop mass. It is applicable to solid, semisolid, liquid, and powder substances.

13.4.7.2 *Apparatus and materials*

13.4.7.2.1 The general design of the MBOM impact test apparatus is given in Figure 13.4.7.1. The following components are required:

A mechanism containing a drop mass of 2.0 kg, two drop mass guide rails, a drop mass holding, lifting, and dropping mechanism, and a 1.0 kg intermediate hammer containing a 1.27 cm diameter steel insert with a surface roughness of 1.3 – 1. 8 µm that is resting on a sample placed on an steel anvil (impact surface 3.8 cm diameter) with a surface roughness of 1.3 – 1. 8 µm. Details of the target area are given in Figure 13.4.7.2.

13.4.7.3 *Procedure*

13.4.7.3.1 Solid sample placement

As a rule substances are tested in the form in which they are received. Wetted substances should be tested with the minimum quantity of wetting agent required for transport. Depending on the physical form, the substances should then be subjected to the following procedures:

(a) Powders are to be tested on the anvil in a monolayer; i.e., the thickness of the granular material. Place enough granules on the anvil to cover an area in excess of the 1.3 cm^2 area of the insert.

(b) Solid propellants are tested in the form of thin, uniform slices. The slices are usually square, having a minimum edge length of 1.6 cm and a thickness of 0.08 ± 0.01 cm. This thickness is easily obtainable with the use of a microtome cutting tool.

The intermediate hammer is raised. The test substance is placed centrally on the anvil. The intermediate hammer is then carefully lowered onto the substance on the anvil.

13.4.7.3.2 Liquids and semisolids sample placement

Depending on the physical form, the substances should then be subjected to the following procedures:

(a) Liquids are tested with a controlled thickness and a fixed gap of 0.05 cm above the liquid level using a spring between the hammer collar and the guide collar (adjustable tension). The thickness of the liquid sample is controlled by putting a piece of 0.015 cm thick tape (compatible with the substance) with a 1.6 cm diameter hole in it on the anvil. The intermediate hammer is raised. The hole in the tape is centrally positioned on the anvil such that the intermediate hammer insert does not touch the tape. A 0.05 cm feeler gauge is used to set the proper gap above the liquid. The tape hole is filled with the liquid substance and levelled-off using a straight-edge ensuring that no air gaps are present in the sample. The intermediate hammer is then carefully lowered to 0.05 cm above the substance on the anvil.

(b) Semisolids (slurries, gels, etc.) are prepared and tested in much the same way as liquid samples; however, the sample thickness is governed by the largest particle size. If the largest particle size is greater than the 0.015 cm thickness then a monolayer sample is spread on the anvil in a monolayer; i.e., the thickness of the granular material. If the cohesive properties of the semisolid are not practical for a 0.015 cm thickness, then the minimum attainable thickness is used. Place enough granules on the anvil to cover an area in excess of the 1.3 cm^2 area of the intermediate hammer insert.

13.4.7.3.3 Machine operation

The drop mass is raised to the desired height (17 cm for solids and semisolids and 11 cm for liquids) and released to drop onto the intermediate hammer. Observations are made on whether a "reaction" occurs as evidenced by audible report or production of smoke, fire, charring or visible light as observed by human senses. The type of reaction that occurs is documented. The surfaces are cleaned with a cloth or light abrasive pad to remove any residual material from the anvil or intermediate hammer insert. The anvil and intermediate hammer insert are inspected for scratches, scoring, divots, or other damage which may affect the surface roughness. If damaged these items should be replaced before use on the next trial. Six trials are performed for each test sample.

13.4.7.4 *Maintenance and calibration*

Moving parts should be inspected to ensure that they are freely moving and that friction between them is minimal. The distance between the drop mass and the intermediate hammer that is resting on the anvil should be verified. The contact area between the intermediate hammer insert and anvil should be uniform. The test machine should be periodically cleaned and calibrated according to a schedule based on the amount of usage. At a minimum, the machine should be calibrated on an annual basis.

13.4.7.5 *Test criteria and method of assessing results*

13.4.7.5.1 Solids

The test result is considered "+" if a reaction (see 13.4.7.3.3) is observed in at least 1 out of 6 trials at a drop height of 17 cm and the substance is considered too dangerous for transport in the form in which it was tested. Otherwise, the result is considered "–". Borderline cases may be resolved using the Bruceton method (see Appendix 2).

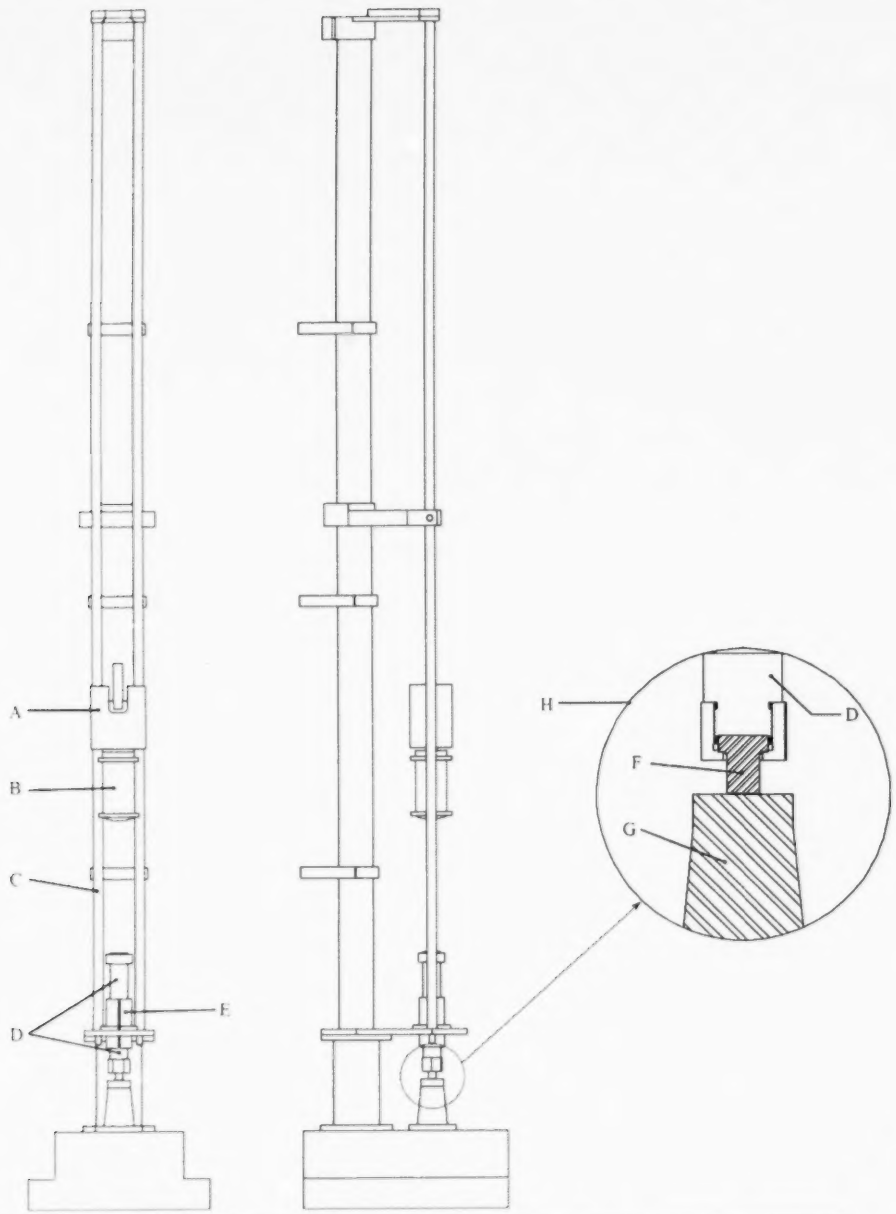
13.4.7.5.2 Liquids

The test result is considered "+" if a reaction (see 13.4.7.3.3) is observed in at least 1 out of 6 trials at a drop height of 11 cm and the substance is considered too dangerous for transport in the form in which it was tested. Otherwise, the result is considered "–". Borderline cases may be resolved using the Bruceton method (see Appendix 2).

13.4.7.6 *Examples of results*

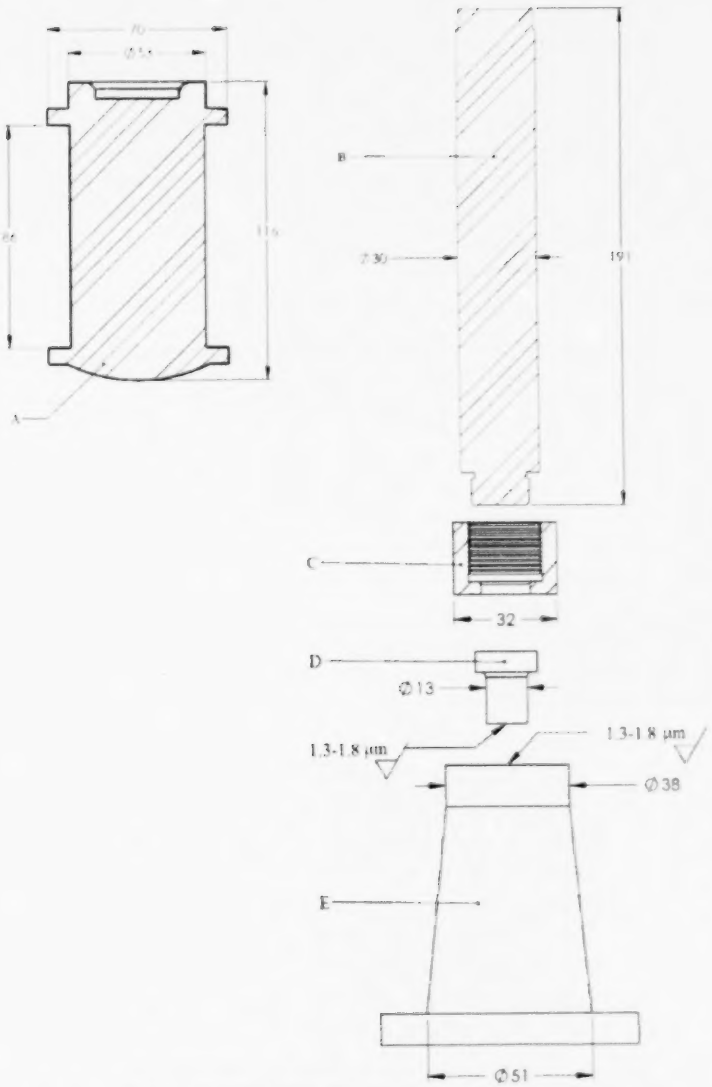
Substances[1]	**Result**
RDX (dry)	+
PBXN-8	–
Nitrocellulose/DNT (90/10)	–
PETN (dry)	+
Nitroglycerin	+

[1] *Data acquired at relative humidity of 10-30% and temperature of 16-24 °C*



(A)	Drop mass lifting, holding, and dropping device	(B)	Drop mass
(C)	Drop mass guild rails	(D)	Intermediate hammer
(E)	Intermediate hammer guide	(F)	Intermediate hammer insert
(G)	Anvil	(H)	Magnified view of target area

Figure 13.4.7.1: MBOM Impact machine



(A)	Drop mass
(B)	Intermediate hammer
(C)	Intermediate hammer insert retaining nut
(D)	Intermediate hammer insert
(E)	Anvil

Figure 13.4.7.2: MBOM Impact machine drop mass and target area detail".

(Reference documents: ST/SG/AC.10/C.3/2014/51 and informal document INF.61/Add.2 of the forty-fifth session)

13.5 Add a new subsection 13.5.4 to read as follows:

"13.5.4 Test 3 (b) (iv): ABL friction machine test

13.5.4.1 *Introduction*

This test is used to measure the sensitiveness of the substance to friction stimuli and to determine if the substance is too dangerous to transport in the form tested. The test substance is subjected to a vertical compression force under a non-rotating wheel, while the substance is moved in a horizontal direction on a sliding anvil. It is applicable to solid, semisolid, and powder substances.

13.5.4.2 *Apparatus and materials*

13.5.4.2.1 The following apparatus and materials are required:

(a) A mechanism capable of applying a force hydraulically through a non-rotating steel wheel to a sample placed on steel anvil. Both the wheel and anvil have a surface roughness of of 1.3 – 1. 8 μm and a Rockwell C hardness of 55 – 62.

(b) A pendulum system that is capable of being positioned and released at an angle that will impart a predetermined velocity to the sliding anvil. A travel distance of approximately 2.5 cm perpendicular to the applied force on the wheel is achieved with this system.

13.5.4.3 *Procedure*

13.5.4.3.1 As a rule, substances are tested in the form in which they are received. Wetted substances should be tested with the minimum quantity of wetting agent required for transport. Depending on the physical form, the substances should then be subjected to the following procedures:

(a) Powders are to be tested on the anvil in a monolayer; i.e., the thickness of the granular material, if possible. Place enough granules on the anvil to approximately cover an area 1.3 cm long by 0.65 cm wide starting about 0.65 cm behind the initial contact point of the wheel with the anvil such that the wheel will be in total contact with the sample when lowered onto it.

(b) Solid propellants are tested in the form of thin, uniform slices with a thickness of 0.08 + 0.01 cm. This thickness is easily obtainable with the use of a microtome cutting tool.

(c) Semisolids will be smoothed with a spatula to a thin layer with uniform thickness approximately 0.015 cm.

With the friction wheel raised, the test substance is placed on the anvil below the wheel such that the wheel will be in total contact with the sample when lowered onto it. The friction wheel is then carefully lowered onto the substance on the anvil and the desired normal force is applied to the wheel 250 N at 2.4 m/s or 445 N at 1.2 m/s. The pendulum is raised to the desired angle to achieve the appropriate test velocity and released. Observations are made on whether a "reaction" occurs as evidenced by audible report or production of smoke, fire, charring or visible light as observed by human senses. The type of reaction that occurs is documented. The force on the wheel is removed and any excess test substance is cleaned from the area. The wheel is indexed and shifted across the anvil in order to ensure that fresh surfaces are used for each trial.

13.5.4.4 *Maintenance and calibration*

The maximum speed of the anvil should be calibrated to 2.4 m/s and 1.2 m/s. The downward force on the wheel should be verified. The test machine should be periodically cleaned and calibrated according to a schedule based on the amount of usage. At a minimum, the machine should be calibrated on an annual basis.

13.5.4.5 *Test criteria and method of assessing results*

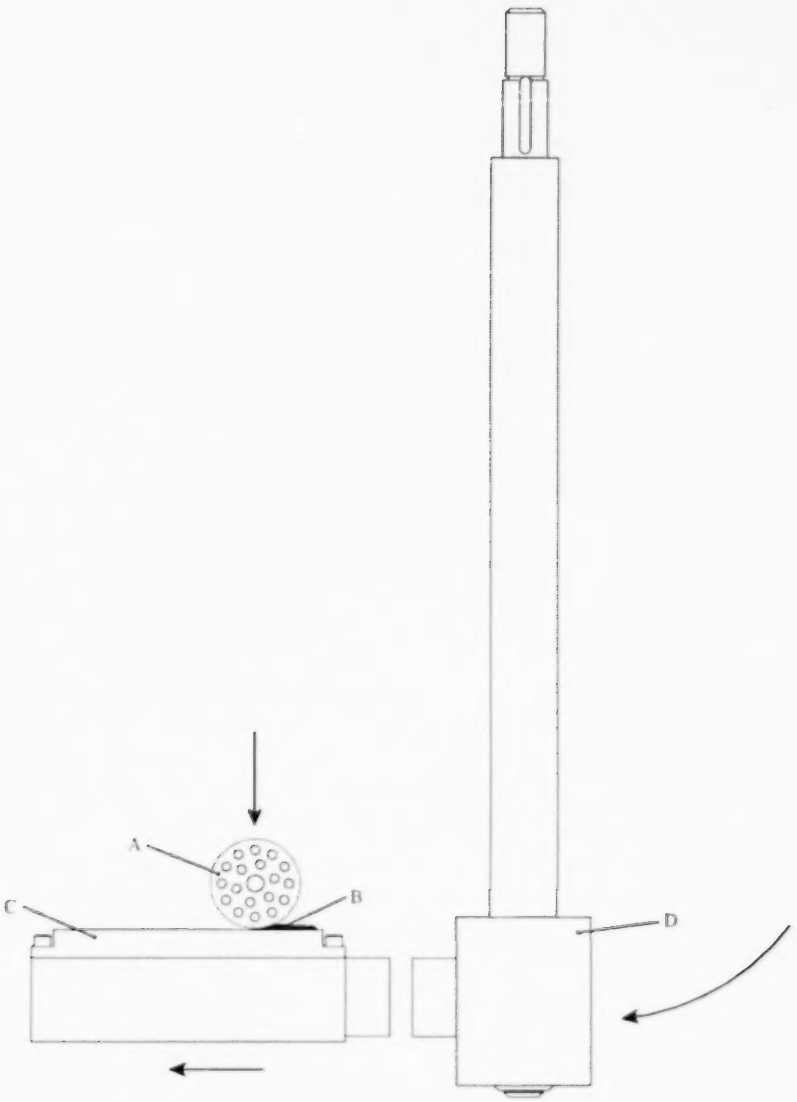
The test result is considered "+" if the lowest friction load at which at least one reaction occurs in six trials is 250 N at 2.4 m/s or 445 N at 1.2 m/s or less and the substance is considered too dangerous for transport in the form in which it was tested. Otherwise, the result is considered "–".

13.5.4.6 *Examples of results*

Substances[1]	**Result**
RDX (class 5)	–
RDX (class 7)	–
PBXN-8	–
PBXN-10	–
Aluminum/TNT (80/20 Mixture)	–
PETN (dry)[2]	+

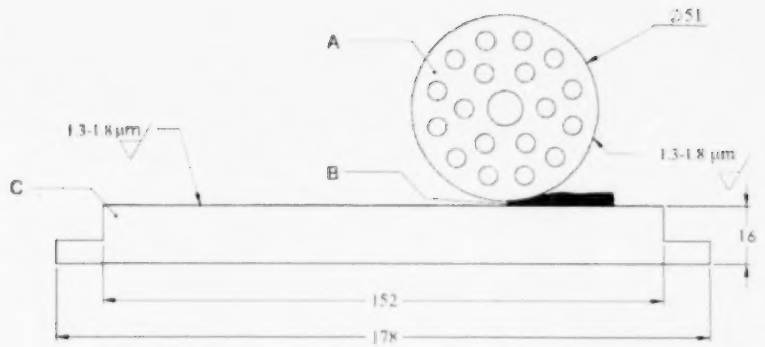
[1] *Data acquired at 2.4 m/s, relative humidity of 10-30%, and temperature of 16-24 °C unless noted otherwise.*

[2] *Data acquired at 2.4 m/s and 1.2 m/s.*



(A)	Non-rotating wheel	(B)	Sample
(C)	Anvil	(D)	Pendulum

Figure 13.5.4.1: ABL Friction machine



(A)	Non-rotating wheel 5.1 cm diameter maximum × 3.18 cm
(B)	Sample under test
(C)	Anvil 18 cm × 5.7 cm × 1.6 cm maximum

Figure 13.5.4.2: ABL Friction machine wheel and anvil detail".

(Reference documents: ST/SG/AC.10/C.3/2014/48 as amended and informal document INF.61/Add.2 of the forty-fifth session)

13.6.1 Amend the title to read: "*Test 3 (c) (i): Thermal stability test at 75 °C*" and amend the table of contents accordingly.

13.6 Add a new subsection 13.6.2 to read as follows:

"13.6.2 Test 3(c) (ii): SBAT thermal stability test at 75 °C

13.6.2.1 *Introduction*

This test is used to measure the stability of the substance when subjected to elevated thermal conditions to determine if the substance is too dangerous for transport.

13.6.2.2 *Apparatus and materials*

13.6.2.2.1 The following apparatus is required:

(a) Glass sample tubes of 13 x 100 mm inside a larger tube of 25 x 100 mm. Each 13 x 100 mm tube is surrounded by insulation and placed into the larger tube. Each larger glass tube has insulation surrounding it further isolating it thermally from the metal oven block. The glass sample tube can be sealed to prevent the escape of gases.

(b) A well-insulated multiport metal block that can be heated with resistance heaters to a temperature of at least 260 °C. The heating of the block must be automated or reliably controlled so that the desired temperature can be maintained within ± 0.5 °C. The heated block should have independent protection against excessively heating the block in the event of a primary control system failure. Each port in the metal block should have a diameter of 5 cm and a depth of 10 cm.

(c) The temperature decay time constant, τ, for the configuration outlined in (a) and (b) should be at least 10 minutes. The decay constant, τ, is found

by heating 5 grams of an inert material (e.g. dried silica, alumina, or silicone) in the sample tube (13 x 100 mm test tube) to a temperature 50 °C or more higher than the constant temperature of the SBAT. The heated sample tube is placed into the SBAT apparatus (into the larger glass tube with internal and external insulation as previously described). The sample will cool to the constant temperature of the oven. While cooling, the sample temperature is recorded. The decaying temperature will be exponential in shape and is fit to the following equation:

$$(T - T_a)/(T_i - T_a) = \exp(-t/\tau)$$

where T is the inert reference temperature that varies with time, T_a is the constant oven temperature, T_i is the initial reference temperature, t is time and τ is the temperature decay time constant.

(d) An inert material (e.g. dried silica, alumina or silicone) to be used as a reference which is also placed into insulated glass tubes (13 x 100 mm inside the larger 25 x 100 mm tube) with the same insulation configuration as the sample.

(e) Thermocouples with a data recording system to record the temperature of the reference and sample(s) as well as thermocouple(s) to measure and control the oven temperature.

13.6.2.3 *Procedure*

13.6.2.3.1 Five grams of the sample or an amount that fills the tube to 75 mm height, whichever is less, is placed inside one of the sample tubes. A second sample tube is filled with the same amount of sample. One of the filled sample tubes is not sealed whereas the second filled sample tube is sealed with a screw cap or other method. For the sample tube that is sealed, the thermocouple is attached to the sidewall of the sample tube. For the open sample tube, the thermocouple can be attached to the side of the tube or inserted into the sample.

13.6.2.3.2 Each sample tube is then surrounded with insulation and placed into the larger 25 x 100 mm tube which is also insulated from the side walls of the SBAT oven ports. The approximately 5 gram reference sample must also be present in one of the SBAT ports with the same insulation configuration as the sample. The samples are heated to 75 – 77 °C and maintained at that temperature for 48 hours. Sample and reference temperatures are recorded throughout the test.

13.6.2.3.3 Once the test has been completed, additional test data may be obtained by linearly increasing the temperature of the apparatus to determine the thermal profile of the sample (measuring endotherms and exotherms, as evidenced by departures of the sample from the temperature of the inert reference).

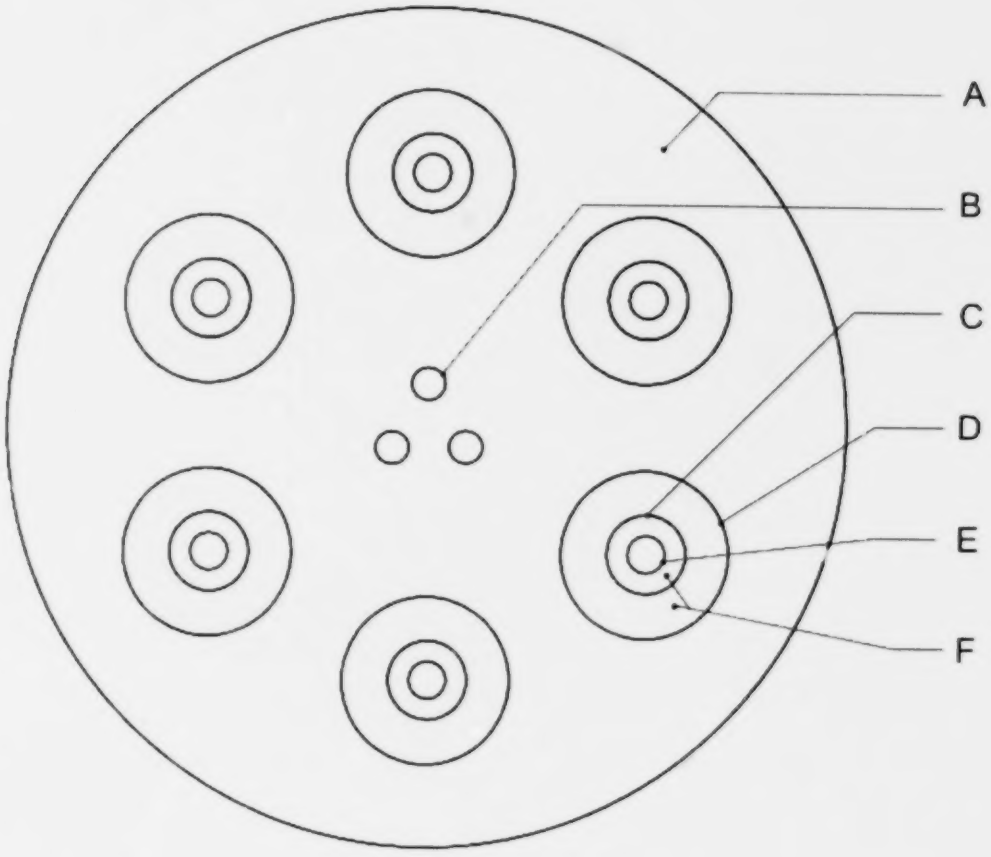
13.6.2.4 *Test criteria and method of assessing results*

13.6.2.4.1 The result from a test is considered "+" if either the sealed or unsealed sample shows more than a 1.5 °C temperature rise during the 48 hour test period indicating self-heating.

13.6.2.4.2 If the test result is "+", the substance should be considered too thermally unstable for transport.

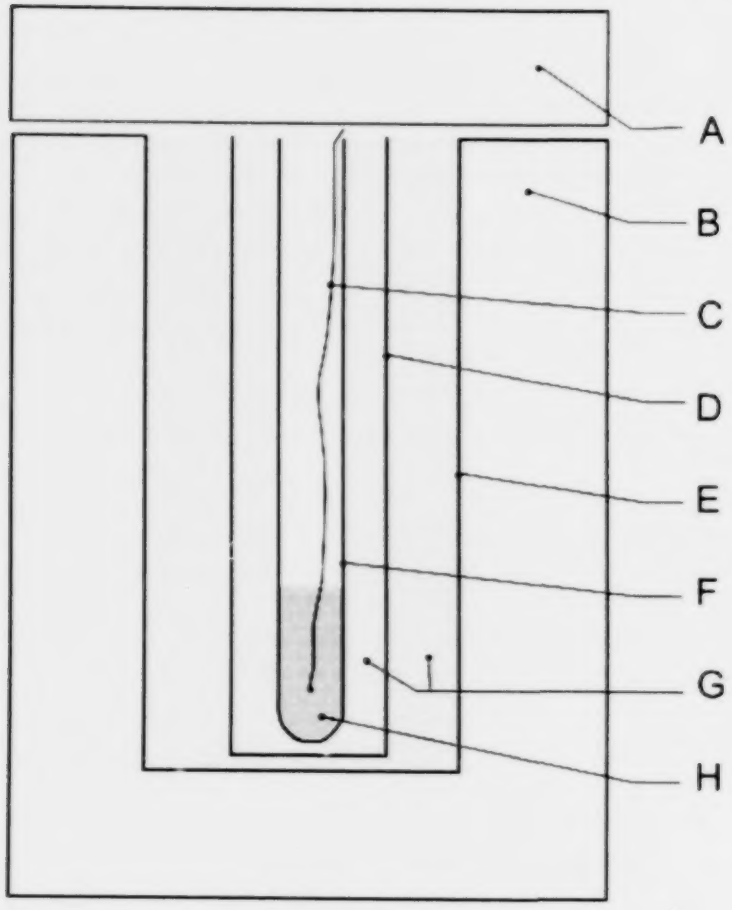
13.6.2.5 *Examples of results*

Substances	Temperature Rise	Result
PETN	Less than 1.5 °C	–
RDX	Less than 1.5 °C	–
TNT	Less than 1.5 °C	–
Composition B, reclaimed	Less than 1.5 °C	–
Double base smokeless powder, 40% NG_3	Less than 1.5 °C	–
Black powder	Less than 1.5 °C	–
Barium styphnate	Less than 1.5 °C	–
Rocket motor propellant (60-70% AP, 5-16% Al, 12-30% binder)	Less than 1.5 °C	–
Catalyst containing copper acetylide	Greater than 1.5 °C	+



(A)	Metal block	(B)	Cartridge heaters
(C)	Glassware	(D)	Sample port
(E)	Glass sample container	(F)	Insulation

Figure 13.6.2.1: SBAT Heating Block



(A)	Insulative cap or blanket	(B)	Metal block
(C)	Thermocouple	(D)	Glassware
(E)	Sample port	(F)	Glass sample container
(G)	Insulation	(H)	Sample

Figure 13.6.2.1: SBAT Port[**]

(Reference documents: ST/SG/AC.10/C.3/2014/52 and informal document INF.61/Add.2 of the forty-fifth session)

Section 16

16.2.2 Amend as follows:

In the first sentence, insert "normally" after "and 6 (d) are". In the second sentence, insert "follow this order or to" after "necessary to".

Third and fourth sentences become new sub-paragraphs (a) and (b) respectively. At the end of both add the following phrase: ". (see also section 16.2.2 (d))".

Former sub-paragraphs (a) and (b) become indents (i) and (ii) under new sub-paragraph (b).

Next two sentences after (i) and (ii), former sub-paragraphs (a) and (b), become sub-paragraphs (c) and (d) respectively. At the end of (d) insert a new sentence to read as follows: "When testing articles to which special provision 347 applies, test type 6(d) may be performed first. If the results of test type 6(d) indicate that a 1.4S classification is appropriate, then test types 6(a) and 6(b) may be waived.".

Delete the last sentence, starting with "The results of test series 6 (c)…".

(Reference documents: ST/SG/AC.10/C.3/2014/4 and informal document INF.61/Add.2 of the forty-fifth session)

16.4.1.2 Amend as follows:

Group sub-paragraphs (a) and (b) and amend to read as follows:

(a) "A detonator to initiate the substance or article or an igniter just sufficient to ensure ignition of the substance or article (see 16.4.1.3.2 and 16.4.1.3.3);".

Renumber sub-paragraphs (c) and (d) as (b) and (c) respectively.

In sub-paragraph (b), former (c), insert "(see 16.4.1.3.4)" after "materials".

In sub-paragraph (c), former (d), replace "3.0" by "3".

(Reference documents: ST/SG/AC.10/C.3/2014/4 and informal document INF.61/Add.2 of the forty-fifth session)

16.5.1.2 Amend as follows:

Group sub-paragraphs (a) and (b) and amend to read as follows:

(a) "A detonator to initiate the substance or article or an igniter just sufficient to ensure ignition of the substance or article (see 16.5.1.4 and 16.5.1.5);".

Renumber sub-paragraphs (c) and (d) as (b) and (c) respectively.

In sub-paragraph (b), former (c), insert "(see 16.5.1.3)" after "materials".

In sub-paragraph (c), former (d), replace "3.0" by "3".

(Reference documents: ST/SG/AC.10/C.3/2014/4 as amended and informal document INF.61/Add.2 of the forty-fifth session)

16.6.1.1 At the end of the sentence, delete "or any other dangerous effect".

(Reference documents: ST/SG/AC.10/C.3/2014/4 and informal document INF.61/Add.2 of the forty-fifth session)

16.6.1.2 (c) Replace "ground" by "fuel surface at the onset of the test".

(Reference documents: ST/SG/AC.10/C.3/2014/4 and informal document INF.61/Add.2 of the forty-fifth session)

16.6.1.2 (h) Amend to read as follows:

"(h) Video equipment capable of recording the events necessary for classification. The type, number and placement of the camera(s) shall be sufficient to record all events to be assessed.".

(Reference document: ST/SG/AC.10/C.3/86/Add.1)

16.6.1.2 After sub-paragraph (h), in the last paragraph, add a last sentence to read as follows: "Further equipment may be needed when following the procedure in 16.6.1.3.9.".

(Reference documents: ST/SG/AC.10/C.3/2014/4 and informal document INF.61/Add.2 of the forty-fifth session)

16.6.1.3.1 Amend to read as follows:

"16.6.1.3.1 The required number of packages or unpackaged articles, in the condition and form in which they are offered for transport, are arranged as close as possible to one another on the metal grid. If directional effects are anticipated, packages or unpackaged articles should be oriented in such a way to maximize probability for projections to hit witness screens and for discrete flame jets to be pointed horizontally. If necessary, the packages or unpackaged articles may be encircled with a steel strip to support them during the test. Fuel is placed beneath the grid so that the fire will engulf the packages or unpackaged articles. Suitable methods of heating include a wood, liquid or gas fuel fire or a combination thereof, which achieves a temperature of 800 °C. Fluctuations of temperature below 800 °C are normal and should not render the test invalid.".

(Reference document: ST/SG/AC.10/C.3/86/Add.1)

16.6.1.3.2 Amend to read as follows:

"16.6.1.3.2 A wood fire should burn the packages or unpackaged articles with sufficient intensity and duration to completely react the explosives (see 16.6.1.2(e)). Dried pallets, boards, laths, or other wood alone or in combination may be stacked to form a lattice beneath the grid 1 m off the ground, and up to the base of the grid supporting the packages or unpackaged articles. The wood should extend at least 1 m beyond the packages or unpackaged articles to ensure that the fire engulfs the product.".

(Reference document: ST/SG/AC.10/C.3/86/Add.1)

16.6.1.3.5 Amend the first three sentences to read as follows:

"The witness screens are erected vertically in each of three quadrants at a distance of 4 m from the edge of the packages or unpackaged articles. The sheets should be placed so that the centres are approximately level with the centre of the packages or unpackaged articles or, if this is less than 1.0 m above the ground, in contact with the ground.".

(Reference document: ST/SG/AC.10/C.3/86/Add.1)

16.6.1.3.6 Amend the last sentence to read as follows:

"A safe waiting period, prescribed by the test agency, should be observed before approaching the test area.".

(Reference document: ST/SG/AC.10/C.3/86/Add.1)

16.6 Add new paragraph 16.6.1.3.9 to read as follows:

"16.6.1.3.9 For candidates to cartridges, small arms (UN No. 0012), this test can be augmented or replaced by the specialised measurement of the energy of projections as described in Appendix 9. This applies to circumstances where the dominant hazard is a projection hazard, for example as known from previous testing of similar explosive articles.".

(Reference documents: ST/SG/AC.10/C.3/2014/109)

16.6.1.4.6 Amend to read as follows:

"16.6.1.4.6 If none of the events occur which would require the product to be assigned to Division 1.1, 1.2, 1.3 or 1.4 other than Compatibility Group S (see Box 32 of Figure 10.3), then the product is assigned to Division 1.4 Compatibility Group S, unless special provision 347 of Chapter 3.3 of the Model Regulations applies. For candidates to Cartridges, small arms (UN No. 0012), evidence of projections with a kinetic energy not exceeding 8 J as determined by the test procedure in Appendix 9 may be used to assign the product to Compatibility Group S.".

(Reference documents: ST/SG/AC.10/C.3/2014/109)

16.7.1.2 Amend as follows:

Group sub-paragraphs (a) and (b) and amend to read as follows:

(a) "A detonator to initiate the substance or article or an igniter just sufficient to ensure ignition of the substance or article (see 16.7.1.3.2); and".

Renumber sub-paragraph (c) as (b).

In sub-paragraph (b), former (c), replace "3.0" by "3".

(Reference documents: ST/SG/AC.10/C.3/2014/4 and informal document INF.61/Add.2 of the forty-fifth session)

16.7.1.4 (b) Replace "capable of igniting" by "that ignites".

(Reference documents: ST/SG/AC.10/C.3/2014/4 and informal document INF.61/Add.2 of the forty-fifth session)

Section 18

(Reference documents: ST/SG/AC.10/C.3/2014/11 and informal document INF.61/Add.4 of the forty-fifth session)

18.1 In the last paragraph, insert "of ANEs" after "the suitability" and "portable" before "tanks".

18.2, Table note b Insert "of ANEs" after "the suitability" and "portable" before "tanks".

18.3.1 Amend to read as follows:

"18.3.1 Unless otherwise specified in these tests, the substance should be tested as offered for transport, at the maximum temperature which may occur during transport (see 1.5.4 of this Manual).".

18.4.1 Amend the word "suspension" in sub-title from the singular to the plural "suspensions".

18.4.1.1 and 18.4.1.1.2 Group and amend to read as follows:

"18.4.1.1.1 This test is used to determine whether a candidate for "ammonium nitrate emulsion, suspension or gel, intermediate for blasting explosives" is thermally stable at temperatures encountered during transport. In the way this type of test is normally carried out (see 28.4.4), the 500 ml insulated test vessel is only representative for packagings, IBCs and small tanks. For the transport of ammonium nitrate emulsions, suspensions or gels the test is used to measure their thermal stability during tank transport if the test is carried out on candidate products which are at a temperature 20 °C higher than the maximum

temperature which may occur during transport, or if higher, at the temperature at the time of loading.".

18.4.1.2.1 After "of a suitable" insert "thermostatically controlled" and after "test chamber" insert "(which may be fan assisted)". Replace "Dewar" by "insulated test" and "measuring equipment" by "recording equipment".

18.4.1.2.2 Amend to read as follows (the last sentence is unchanged):

"18.4.1.2.2 The test should be performed following a risk assessment, taking account of the potential for fire and/or explosion in the test chamber, and the application of appropriate control measures for the protection of persons and property. A number of tests may be run concurrently. The recording system should be housed in a separate observation area.".

18.4.1.2.3 Amend as follows:

In the first sentence, replace "A thermostatically controlled drying oven (which may be fan-assisted)" by "The test chamber must be" and "Dewar vessel may be used" by "insulated test vessels.".

In the second sentence, replace "oven" by "test chamber", "Dewar" by "insulated test" and "± 1 °C" by "± 2 °C".

In the third sentence, replace "oven" by "test chamber".

Delete the 2 last sentences.

18.4.1.2.4 In the first sentence, replace "Dewar" by "Insulated test" and insert "approximately" before "500 ml". In the second sentence, replace "Dewar" by "test". Delete the last sentence.

18.4.1.2.5 Replace "Dewar" by "insulated test" and "should" by "must". In the third sentence, replace "can be" by "are" and amend the end to read as follows: "filled with a known inert liquid substance e.g. distilled water." In the last sentence, replace "can be" by "is".

18.4.1.2.6 Replace "Dewar" by "Insulated test".

18.4.1.2.7 Delete.

18.4.1.3.1 Insert "at" before "the temperature". Amend the second and third sentences to read as follows: "Fill the test vessel with the substance under test to about 80% of the capacity of the test vessel, or approximately 400 ml.". Amend the beginning of the last sentence to read as follows: "Seal the lid of the test vessel and place it in the test chamber,...", remainder unchanged.

18.4.1.3.2 Amend the first sentence to read as follows: "The temperature of the sample and of the test chamber are continuously monitored.". Delete the last sentence.

18.4.1.3.3 Amend to read as follows:

"18.4.1.3.3 At the end of the test, allow the sample to cool, remove it from the test chamber and carefully dispose of it as soon as possible.".

18.4.1.4.1 Insert "within the seven day period" after "6 °C or more".

Figure 18.4.1.1 Delete.

18.5.1.1 Replace "donor" by "booster".

18.5.1.2.1 Replace "(donor)" by "(booster charge)", "test charge" by "sample substance" and insert "charge" after "acceptor".

18.5.1.2.1 (a) Amend to read as follows:

"(a) Detonators of sufficient strength to effectively initiate the booster charge;".

18.5.1.2.1 (b) Amend to read as follows:

"(b) Booster charges consisting of 95 mm diameter by 95 mm long pellet with a density of 1 600 kg/m^3 ± 50 kg/m^3 of either Pentolite (PETN/TNT with a minimum 50% PETN), Composition B (RDX/TNT with a minimum 50% RDX) or RDX/WAX (with a minimum 95% RDX);".

18.5.1.2.1 (c) Delete "seamless."

18.5.1.2.1 (d) Amend to read as follows:

"(d) Sample substances (acceptor charges):".

18.5.1.2.1 (e) Delete the last sentence.

18.5.1.2.1 (f) Insert "approximately" before "200 mm".

18.5.1.2.1 (g) Insert "approximately" before "25 mm", at the end add: "in place against the booster charge:".

18.5.1.2.1 Add a new sub-paragraph (h) to read as follows:

"(h) Wood blocks or similar to stand the assembly at least 100 mm off the ground.".

18.5.1.3.1 Amend to read as follows:

"18.5.1.3.1 As shown in Figure 18.5.1.1, the detonator, booster charge, PMMA gap and acceptor charge are coaxially aligned above the centre of the witness plate. The bottom end of the tube is sealed with a single layer of cloth adhesive tape, or equivalent, to contain the sample substance which is carefully loaded so as to avoid the formation of voids within the sample or between the sample and the tube walls. The surface of the sample should be level with the rim of the tube. Care should be taken to ensure good contact between the detonator, the booster charge, the PMMA cylinder and the acceptor charge. The sample substance should be at ambient temperature. The wood block holding the detonator, the booster charge, the PMMA cylinder and the steel tube should be held firmly in alignment (e.g. by using a band of adhesive tape at each intersection).".

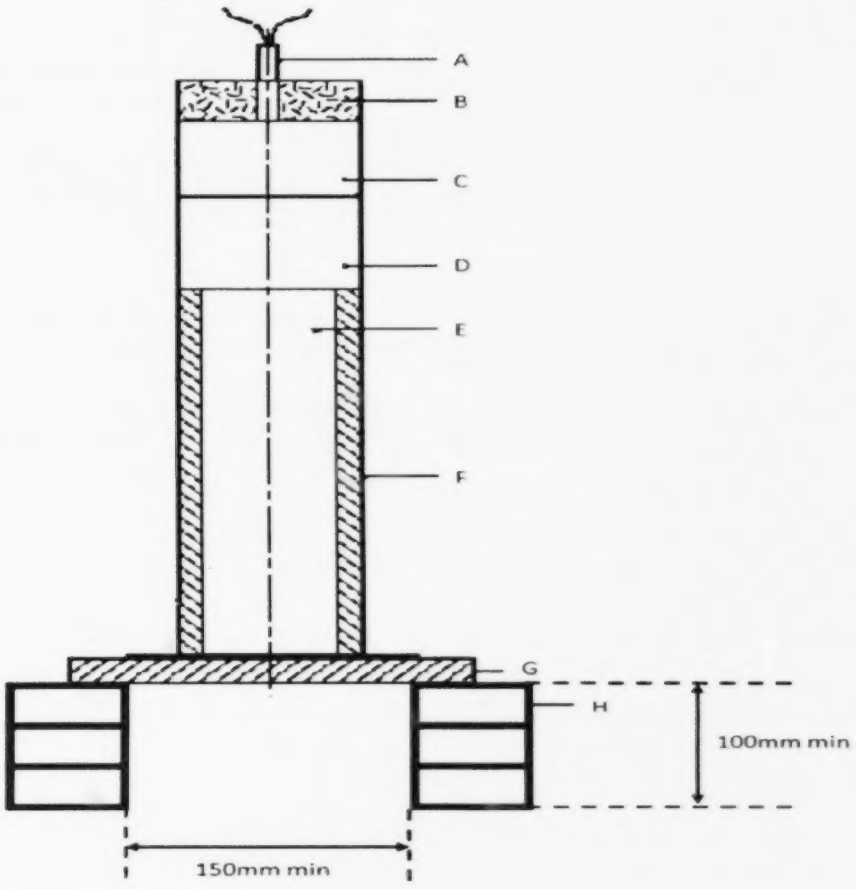
18.5.1.3.2 Amend to read as follows:

"18.5.1.3.2 The whole assembly, including the witness plate, is raised above the ground, with at least a 100 mm air gap between the ground and the bottom surface of the witness plate which is supported along two edges only with wooden blocks, or similar, as shown in Figure 18.5.1.1. The location of the blocks must ensure there is a clear space under where the tube is standing on the witness plate. To assist in collecting the remains of the witness plate, the whole assembly should be vertical (e.g. checked with a spirit level).".

18.5.1.3.3 Delete the first sentence.

18.5.1.4 Insert "and propagated" after "a detonation was initiated". Amend the middle of the second sentence to read: "…which detonates and punches a hole in the witness plate in any trial is not to be classified…".

18.5, Figure 18.5.1.1 Replace Figure 18.5.1.1 and caption by the following ones *(the heading of the figure remains unchanged)*:



(A) Detonator	(B) Wooden detonator holder	(C) Booster charge
(D) PMMA gap	(E) Substance under test	(F) Steel Tube
(G) Witness plate	(H) Wooden blocks	

Table 18.5.1.1 and Figure 18.5.1.2 Delete.

18.6.1.2.1 Amend the end of the first paragraph to read as follows:

"...and is available with numerous sized orifices. For this test the following diameter holes are used:

- 1.5 mm for the closing plate used in the heating calibration procedure; and
- 2.0 mm for the closing plate used in the test.

The dimensions of the threaded collar and the nut (closing device) are given in Figure 18.6.1.1.".

18.6.1.2.1 (a) Delete the remainder of the sentence after "26.5 ± 1.5 g".

18.6.1.2.2 Replace "propane" by "a gaseous fuel (e.g. propane)". Delete the second sentence. Insert "or equivalent" after "dibutyl phthalate" and insert "and inserted through the orifice plate" after "rim of the tube".

18.6.1.2.3 In the first sentence, insert a full stop after "welded box" and replace the remainder of the sentence by "A suitable arrangement of the construction and dimensions of the box is given in Figure 18.6.1.2.". In the fourth sentence, replace "The arrangement" by "A suitable arrangement".

18.6 Insert a new paragraph 18.6.1.2.4 to read as follows:

"18.6.1.2.4 A video camera should be provided to record the test and to ensure all burners are functional during the test. The camera may also provide evidence of blockages of the orifice by solids within the sample.".

18.6.1.3.1 Replace "appropriate" by "2 mm" and "molybdenum disulphide based lubricant" by "high temperature anti-seize compound (e.g. molybdenum disulphide based lubricant)".

18.6.1.3.2 Delete the first sentence.

18.6.1.3.3 At the end, add "to ensure all pieces have been recovered".

18.6.1.3.4 Replace ""no explosion"" by ""no explosion (negative (-))"" and ""explosion"" by ""explosion (positive (+))"".

18.6.1.3.5 Amend to read as follows:

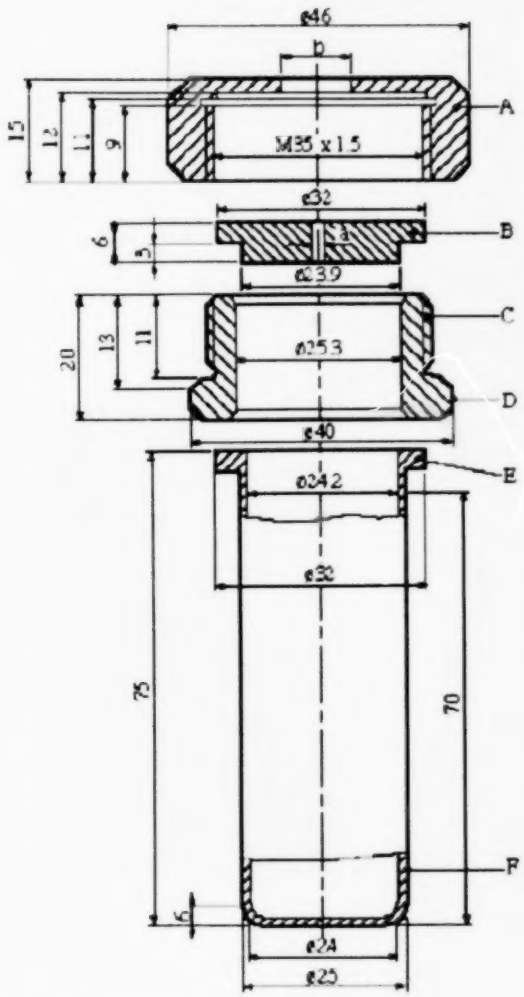
"18.6.1.3.5 The test is performed to achieve negative (-) results in three tests.

Given the nature of ammonium nitrate emulsions, suspensions or gels and the possibility of varying percentages of solids present, blockages of the orifices may occur during testing potentially leading to a false "+" result. Where this is observed the test may be repeated (maximum twice).".

18.6.1.4 Amend the end of the paragraph to read as follows: "...Division 5.1 if three negative (-) results cannot be achieved within a maximum of five tests.".

Figures 18.6.1.1 and 18.6.1.2 Replace by the following figures:

"



(A) Nut (b = 10 mm) with flats for size 41 spanner
(B) Orifice plate (a = 1.5 or 2.0 mm)
(C) Threaded collar
(D) Flats for size 36 spanner
(E) Flange
(F) Tube

Figure 18.6.1.1: TEST TUBE ASSEMBLY

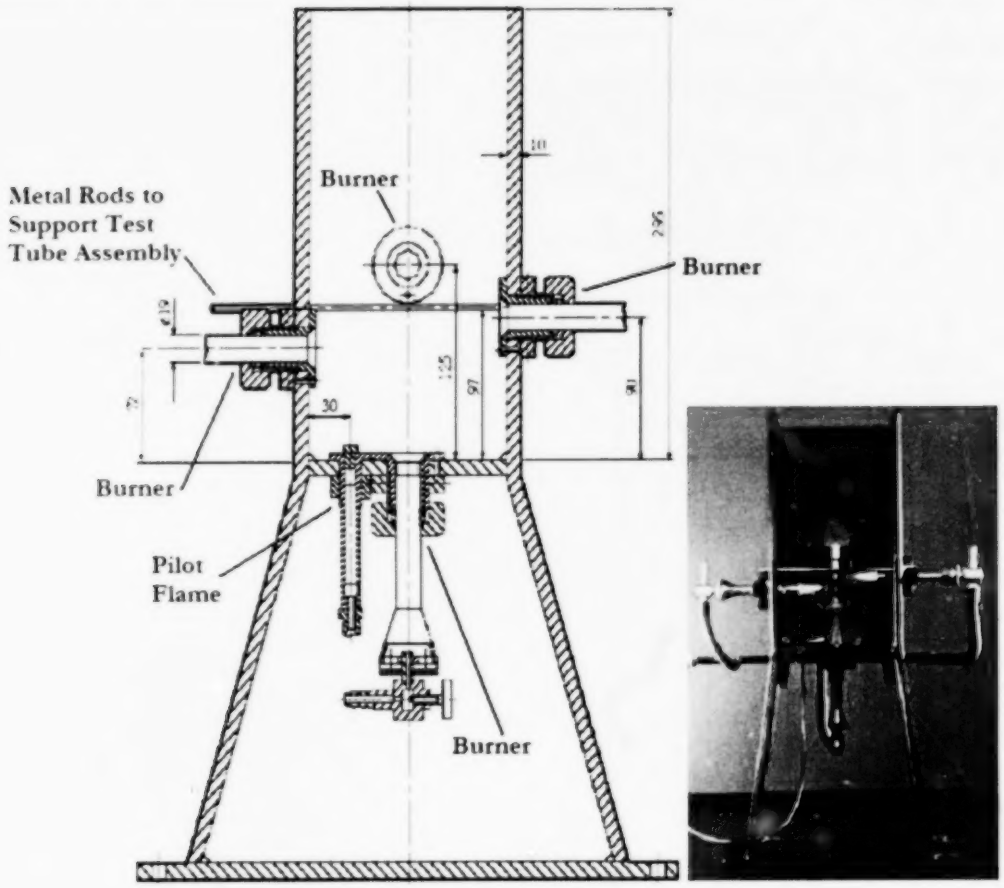


Figure 18.6.1.2 HEATING DEVICE

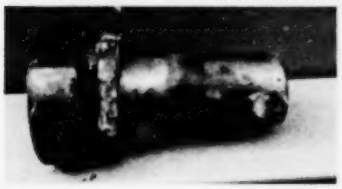
Figure 18.6.1.3 After the existing figure, add the following pictures:

"**Examples of Koenen test results**

"**O": Tube unchanged**

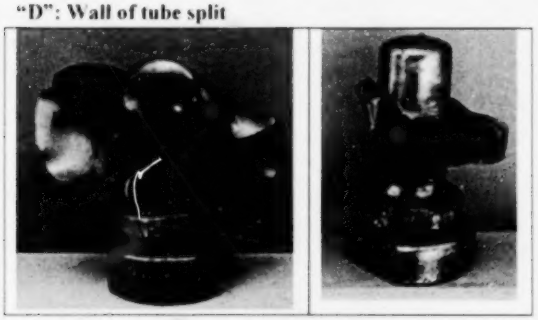
"**A": Bottom of the tube bulged out**

"**B": Bottom and wall of the tube bulged out**

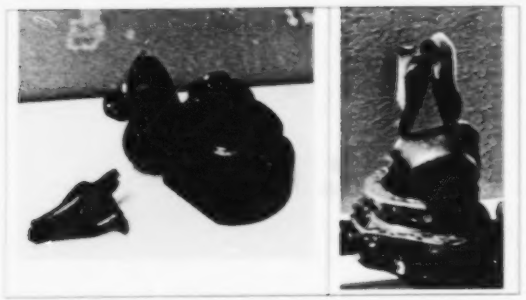


"**C**": *Reserved*

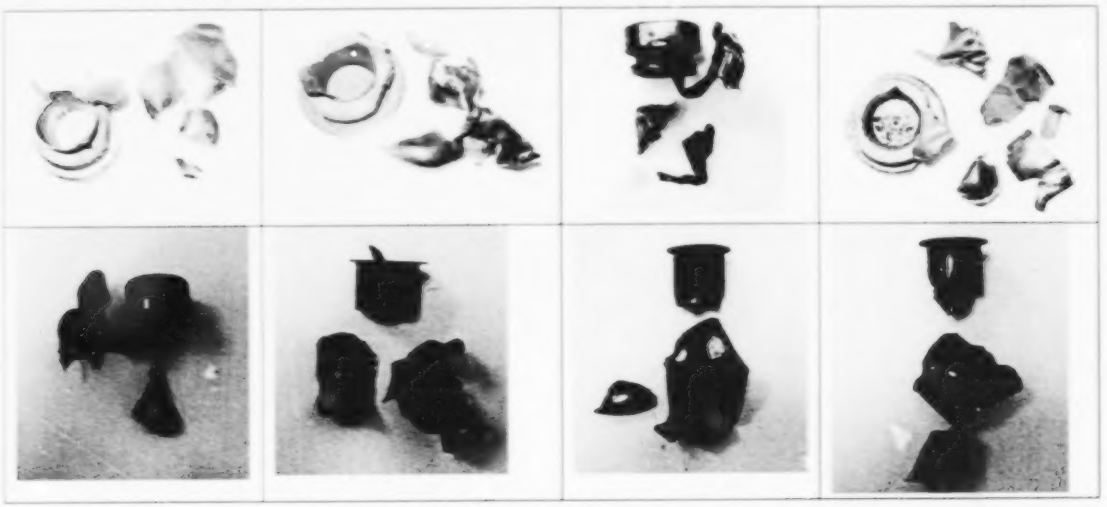
"**D": Wall of tube split**



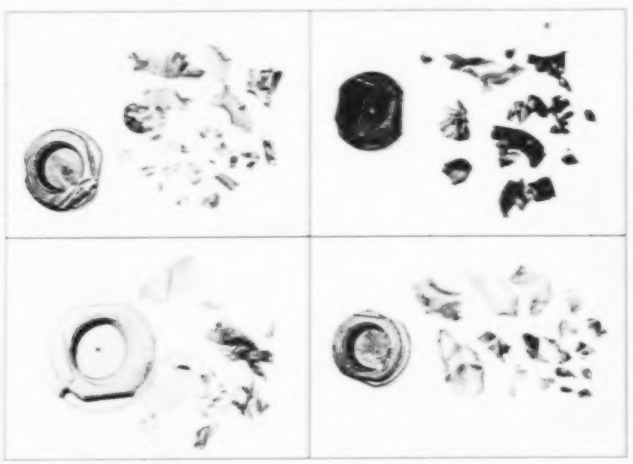
"**E": Tube split into two fragments**



"F": Tube fragmented into three or more mainly large pieces which in some cases may be connected with each other by a narrow strip:



"G": Tube fragmented into many mainly smaller pieces, closing device undamaged



18.7.1.2 (a) Add the following sentences at the end to read as follows: "All welding should be to a relevant ISO standard or equivalent. All steel components are to be Schedule 40 carbon steel (A53 Grade B) or equivalent;".

18.7.1.2 (b) Replace "fuel" by "fire". Insert "approximately" before "1.0 m". Amend the end of the paragraph to read as follows: "...the grid should be approximately 0.5 m above the fuel surface at the onset of the test".

18.7.1.2 (c) Amend the beginning to read as follows: "Enough fuel to produce a fire reaching 800 °C (measured at the external base of the pipe) and to keep burning ...". At the end, add: ", evidenced by ejection of material, smoke, fumes, flames, etc., from the top of the pipe. Temporary variation of temperature below 800 °C is normal and should not render the test invalid".

18.7.1.2 (d) Amend the end of the paragraph to read as follows: "...soak the wood and igniters;".

18.7.1.2 (e) Amend to read as follows:

"(e) Video cameras to record events in colour;".

18.7.1.2 (f) Amend to read as follows:

"(f) Means of measuring and recording temperature, up to and above 800 °C, with a thermocouple located at the external base of the pipe;".

18.7.1.2 Add a new sub-paragraph (g) to read as follows:

"(g) A means of measuring wind speed, such as an anemometer.".

18.7.1.3.1 In the fourth sentence, insert ", extending in every direction beyond the pipe" after "beneath the grid" and "fully" before "engulf". In the last sentence, delete "using a lattice of wooden laths".

18.7.1.3.2 and 18.7.1.3.3 Amend to read as follows:

"18.7.1.3.2 The test should not be performed under conditions where the wind speed consistently exceeds 6 m/s.

18.7.1.3.3 Observations are made on the following:

(a) Wind speed at commencement of the test as per Section 18.7.1.3.2;

(b) Fire duration of at least 30 minutes or until the substance has clearly had enough time to react to the fire, with 800 °C reached at the external base of the pipe;

(c) Temperature at the external base of pipe;

(d) Substance reacting to the fire as described in 18.7.1.2(c);

(e) Evidence of explosion (e.g. fragmentation of the pipe into two or more pieces);

(f) Projection of fragments of the pipe section from the fire area;

(g) Evidence of a rupture (e.g. a split of the pipe or separation of the pipe from the base plate at the weld).".

18.7.1.3.4 to 18.7.1.3.6 Delete.

18.7.1.4 Amend to read as follows:

"18.7.1.4 *Test criteria and method of assessing results*

A test is considered valid if observation criteria outlined in Section 18.7.1.3.3 (a) to (d) have been met.

The test result is considered "+" and the substance should not be transported in portable tanks as a dangerous good of Division 5.1 if an explosion and/or fragmentation of the pipe, as specified in Section 18.7.1.3.3 (e) and (f) is observed.

The test result is considered "-" if no explosion and/or fragmentation of the pipe is observed. Splitting of the pipe or its separation from the end plates, as specified in Section 18.7.1.3.3 (g) is evidence of a "-" result.".

18.7.2.1 Amend the end of the first paragraph to read as follows: "…the suitability of a candidate for "ammonium nitrate emulsion or suspension or gel, intermediate for blasting explosives", to be transported in portable tanks as a dangerous substance of Division 5.1.".

18.7.2.2 (a) Insert a new fourth sentence to read as follows: "All welding should be to a relevant ISO standard or equivalent.". In the last sentence, move "neatly" to before "accommodate".

18.7.2.2 (b) Insert ", or similar solid base," before "about 400 mm".

18.7.2.2 (c) Insert "approximately" before "150 mm". At the end add: "or similar solid base".

18.7.2.2 (d) In the first sentence, replace "propane" by "fuel gas (e.g. propane)". In the second sentence, insert ", or similar solid base," after "concrete block".

18.7.2.2 Add a new sub-paragraph (e) to read as follows:

"(e) Enough fuel to produce a fire reaching 800 °C (measured at the external base of the pipe) and to keep burning for at least 60 minutes or, if necessary, until the substance has clearly had enough time to react to the fire, evidenced by ejection of material, smoke, fumes, flames, etc., from the top of the pipe. Temporary variation of temperature below 800 °C is normal and should not render the test invalid;".

Renumber sub-paragraphs (e) to (k) accordingly.

18.7.2.2 (f) former (e) In the first sentence, replace "propane" by "fuel gas". In the third sentence, insert "about" before "600 mm" and replace "the height is" by "the height should be about". In the fourth sentence insert "approximately" before "150 mm".

18.7.2.2 (g) former (f) In the first sentence, replace "Propane" by "Fuel gas". Delete the second sentence and replace "propane" by "fuel gas" everywhere else in the paragraph (three times). Replace "measuring up to 60 g/min of propane" by "measuring up to 60 g/min".

18.7.2.2 (h) former (i) Insert "approximately" before "500 (2)".

18.7.2.2 (l) former (k) Amend to read as follows:

"(l) The candidate ammonium nitrate emulsion or suspension or gel, intermediate for blasting explosives to be tested;".

18.7.2.2 Add a new sub-paragraph (m) to read as follows:

"(m) A means of measuring wind speed at the commencement of the test, such as an anemometer;".

18.7.2.2 Number the last sentence as sub-paragraph (n).

18.7.2.3.1 In the first sentence, insert "about" before "435 mm)".

18.7.2.3.3 In the first sentence, replace "ANE" by "test".

18.7.2.4.1 In the first sentence, insert ", or similar solid base," after "concrete block". In the second sentence, replace "propane" by "fuel gas" and "concrete block" by "solid base".

18.7.2.4.2 In the second sentence, insert "approximately" before "435 mm" and replace "ANE" by "substance" twice. In the last sentence, replace "propane" by "gas".

18.7.2.4.3 (c) Insert "about" before "20 mm".

18.7.2.4.3 The amendment to the last paragraph does not apply to the English text.

18.7.2.4.4 In the first sentence, replace "Propane" by "Fuel gas". Amend the end of the paragraph to read as follows: "…exceeds 6 m/s, unless additional precautions against side winds are taken to avoid dissipation of the heat.".

18.7.2.4.5 In the first sentence, replace "propane" by "fuel gas".

18.7.2.4.7 Amend to read as follows:

"18.7.2.4.7 Observations are made on the following:

(a) Wind speed at commencement of the test as per Section 18.7.2.4.4;

(b) Fire duration of at least 60 minutes or until the substance has clearly had enough time to react to the fire, with 800 °C reached at the external base of the pipe;

(c) Temperature at the external base of pipe;

(d) Substance reacting to the fire as described in 18.7.2.2(e);

(e) Evidence of explosion (e.g. fragmentation of the pipe into two or more pieces);

(f) Projection of fragments of the pipe section from the fire area;

(g) Evidence of a rupture (e.g. a split of the pipe or separation of the pipe from the base plate at the weld).".

18.7.2.4.8 Amend to read as follows:

"18.7.2.4.8 *Test criteria and method of assessing results*

A test is considered valid if observation criteria outlined in Section 18.7.2.4.7 (a) to (d) have been met.

The test result is considered "+" and the substance should not be transported in portable tanks as a dangerous good of Division 5.1 if an explosion and/or fragmentation of the pipe, as specified in Section 18.7.2.4.7 (e) and (f) is observed

The test result is considered "-" if no explosion and/or fragmentation of the pipe is observed. Splitting of the pipe or its separation from the end plates, as specified in Section 18.7.2.4.7 (g) is evidence of a "-" result.".

18.7.2.5 Delete.

18.7.2.6 Renumber as 18.7.2.5.

Part II

Section 21

21.1.2 At the end, replace "Series A test may be used" by "Series A test should be performed".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

21.1, Table 21.1 Delete the entry for "A2".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

21.3.2 At the end insert ", if known".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

21.4.3.2 Amend as follows:

In the second sentence, replace "cold-drawn" by "an annealed" and "4.0 ± 0.1" by "4".

In the fourth sentence, replace "two layers of 0.08 mm thick polythene" by "a plastics", insert "tightly" before "in place" and delete the remainder of the sentence after "in place".

Amend the fifth and sixth sentences to read as follows: "The plastics sheet shall be compatible with the substance under test. The booster charge consists of 160 g RDX/wax (95/5) or PETN/TNT that has a minimum of 50% PETN in the mixture, 50 ± 1 mm in diameter with a density of 1 600 ± 50 kg/m^3.".

In the seventh sentence, replace "RDX/wax charge" by "charges".

In the eighth sentence, replace "3.2 ± 0.2" by "3" and "is mounted" by "may be mounted".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

21.4.3.3.1 Delete the last sentence.

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

21.4.4.2 Amend as follows:

In the second sentence, replace "cold-drawn" by "an annealed".

In the fourth sentence, replace "two layers of 0.08 mm thick polythene" by "a plastics", insert "tightly" before "in place" and delete the remainder of the sentence after "in place".

Amend the fifth and sixth sentences to read as follows: "The plastics sheet shall be compatible with the substance under test. The booster charge is a 200 g RDX/wax (95/5) or PETN/TNT that has a minimum of 50% PETN in the mixture, 60 ± 1 mm in diameter with a density of 1 600 ± 50 kg/m^3.".

In the seventh sentence, replace "RDX/wax charge" by "charges".

In the last sentence, replace "3.2" by "3" and "is mounted" by "may be mounted".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

21.4.4.3 Delete the fourth sentence.

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

Section 23

23.2.1 Replace "Does it propagate" by "Can it propagate".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

23.1, Table 23.1 In the entry for "C.2", under "Section", replace "23.4.3" by "23.4.2".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

23.4.1.2.1 In the seventh sentence, replace "55 mm" by "59 mm".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

23.4.1.2.2 Amend the beginning of the third sentence to read as follows: "A suitable deformable washer or rubber ring is used…", remainder unchanged.

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

23.4.1.2.6 Amend the beginning of the fourth sentence to read as follows: "An approximately 13 mm…", remainder unchanged.

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

23.4.1.2.7 Amend to read as follows:

"23.4.1.2.7 For liquids samples, a single piece of thin PVC sheathing, or equivalent, is used to cover the primed cambric in such a way that the primed cambric is not in contact with the liquid sample. The leads of the resistance wire are then fixed onto the terminals of the firing plug such that the tip of the primed cambric is above the surface of the firing plug.".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

23.4.1.3.1 Amend as follows:

In the sixth sentence, replace "lead washer" by "washer or rubber ring".

In the eighth sentence, replace "An exploder dynamo" by "A power source".

In the last sentence, insert "data acquisition" after "suitable" and delete the last phrase in brackets.

In footnote 3, delete the square brackets around "burning".

The consequential amendment does not apply to the English text.

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

23.4, Figure 23.4.1.1 In the caption, amend the entry for "(L)" to read "Insulation" and the entry for "(D)" to read "Deformable washer".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

23.4.2.2.1 Add a new second sentence to read as follows: "The windows are not necessary when using thermocouples to measure the deflagration rate.".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

23.4.2.2.2 Amend the end of the second sentence to read as follows: "…cooling with water or other suitable material filled to a height of 20 mm below the rim (i.e. 265 cm^3) of Dewar vessel, closed by a tight fitting cork, should be longer than 5 hours.".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

23.4.2.3.2 Amend the end of the third sentence to read as follows: "…is filled to a height of 20 mm below the rim with the substance.".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

23.4.2.3.3 In the second sentence, replace "should" by "shall".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

23.4.2.5 In the entry for "Dicetyl peroxydicarbonate", under "Result", amend to read "No".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

Section 25

25.4.1.2.1 In the fifth sentence, insert a full stop after "chrome steel". Amend the rest of the text before the last sentence to read as follows: "For classification the following diameter holes shall be used: 1.0 - 1.5 - 2.0 - 2.5 - 3.0 - 5.0 - 8.0 - 12.0 - 20.0 mm. In addition, other diameters can be used for hazard assessment.". Remainder unchanged.

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

25.4.1.2.2 In the penultimate sentence, at the end insert "or equivalent".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

25.4.1.3.1 Amend to read as follows:

"25.4.1.3.1 The tube is filled to a height of 60 mm from the bottom of the tube. Cast solids should be cast to the internal dimensions of the steel tube with a height of 60 mm and then placed inside the tube. Powders are filled in approximately three equal increments with tamping[1] to 80 N force between each increment. Liquids and gels are loaded into the tube to a height of 60 mm taking particular care with gels to prevent the formation of voids. Determine the total mass used to fill the tube to this level and use this amount of solid for each trial filling being performed. The threaded collar is slipped onto the tube from below, the appropriate orifice plate is inserted and the nut tightened by hand after applying some molybdenum disulphide based lubricant. It is essential to check that none of the substance is trapped between the flange and the plate, or in the threads.".

Footnote 1 unchanged.

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

25.4.1.3.5 Amend as follows:

In the first sentence, replace "trails" by "trials" and "of 20.0 mm" by "with a certain diameter".

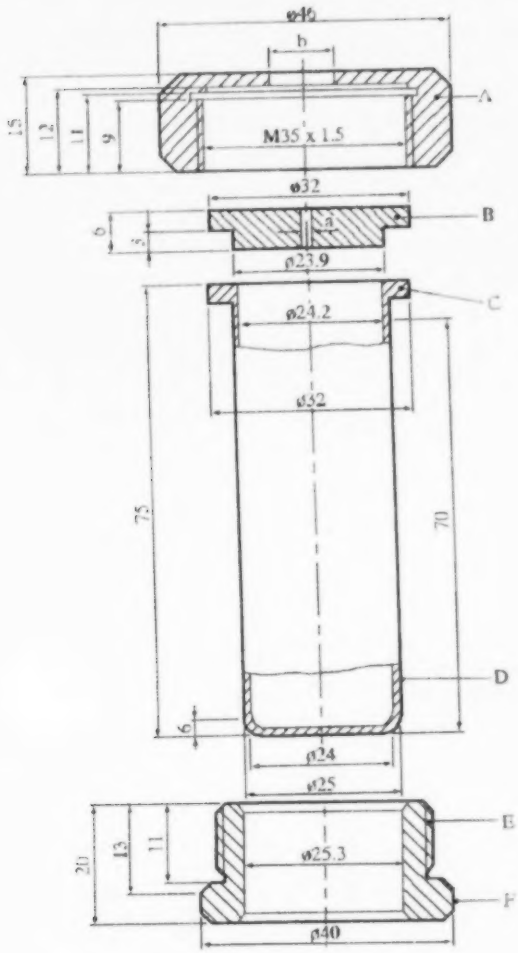
Amend the end of the second sentence to read as follows: "…series is continued with single trials at increasing diameters until only negative results in three tests are obtained at the same level.".

In the third sentence, replace "at 20.0 mm" by "in the first trial" and "following orifices 12.0 - 8.0 - 5.0 - 3.0 - 2.0 - 1.5" by "decreasing diameters".

In the fourth sentence, delete "according to the sequence given in 25.4.1.2.1." and replace "level" by "diameter".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

25.4.1.1 Replace Figure 25.4.1.1 and caption with the following ones:



(A) Nut (b = 10.0 or 20.0 mm) with flats for size 41 spanner
(B) Orifice plate (a = 1.0 to 20.0 mm diameter)
(C) Flange
(D) Tube
(E) Threaded collar
(F) Flats for size 36 spanner

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

25.4.2.2.1 Insert a new third sentence to read as follows: "In addition other diameters may be used for hazard assessment.".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

25.4.2.2.2 In the fourth sentence, insert "or equivalent" after "dibutyl phthalate".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

25.4.2.3.1 Delete the third sentence that reads "The 16.0 mm orifice plate is used first." In the fourth sentence, replace "central" with "the selected". At the end of the seventh sentence, replace "which is inside" with "which may be placed inside".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

25.4.2.3.3 Amend the first sentence to read as follows: "The series of trials is started with a single trial using an orifice plate with a certain diameter. If there is no rupture of the disc with this orifice, experiments are performed with single trial using plates with decreasing diameters until rupture of the disc occurs.".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

25.4.2.4.2 In the description of "Medium", replace "6.0 mm" by "larger but smaller than 9.0 mm". In the description of "Low", replace "2.0 mm" by "larger but smaller than 3.5 mm".

(Reference document: informal document INF.61/Add.2 of the forty-fifth session)

Part 3

Section 32

32.3.2 Insert a new sub-section 32.3.2.4 to read as follows:

"32.3.2.4 The classification scheme of liquid desensitized explosives for supply and use (including storage) according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) is referred to section 51.".

(Reference document: ST/SG/AC.10/C.3/2014/2)

Section 33

33.2.3 Insert a new sub-section 33.2.3.4 to read as follows:

"33.2.3.4 The classification scheme of solid desensitized explosives for supply and use (including storage) according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) is referred to section 51.".

(Reference document: ST/SG/AC.10/C.3/2014/2)

Section 38

38.3.2.1 Amend the last sentence to read as follows:

"A component cell that is transported separately from the battery shall be subjected to tests T.1 to T.6 and T.8.".

(Reference document: ST/SG/AC.10/C.3/90/Add.1)

38.3.2.2 In the Note, add a new subparagraph (f) to read as follows:

"(f) For batteries which are to be tested according to T.4 with a peak acceleration less than 150 g_n, a change in the mass which could adversely impact the result of the T.4 test and lead to a failure.".

(Reference document: informal document INF.11 of the forty-fifth session, proposition 1)

38.3.2.3 Amend the definitions hereafter to read as follows:

"*Cell* means a single encased electrochemical unit (one positive and one negative electrode) which exhibits a voltage differential across its two terminals, and may contain protective devices. See definitions for battery and single cell battery.".

"*Component cell* means a cell contained in a battery. A component cell is not to be considered a single cell battery.".

"*Battery* means two or more cells or batteries which are electrically connected together and fitted with devices necessary for use, for example, case, terminals, marking or protective devices. Units which have two or more cells that are commonly referred to as "battery packs", "modules" or "battery assemblies" having the primary function of providing a source of power to another piece of equipment are for the purposes of the Model Regulations and this Manual treated as batteries. See definitions for cell and single cell battery.".

"*Single cell battery* means a cell [externally] fitted with devices necessary for use in equipment or another battery which it is designed to power, for example protective devices. See definitions for cell and battery.

NOTE *A single cell battery is considered a "cell" and shall be tested according to the testing requirements for "cells" for the purposes of the Model Regulations and this Manual."*

(Reference document: ST/SG/AC.10/C.3/90/Add.1)

38.3.3 (d) Amend the last paragraph to read as follows:

"Batteries or single cell batteries not equipped with battery overcharge protection that are designed for use only as a component in another battery or in equipment, which affords such protection, are not subject to the requirements of this test.".

(Reference document: ST/SG/AC.10/C.3/90/Add.1)

38.3.3 (f) Amend to read as follows:

"(f) When testing a battery in which the aggregate lithium content of all anodes, when fully charged, is not more than 500 g, or in the case of a lithium ion battery, with a Watt-hour rating of not more than 6 200 Wh, that is assembled from batteries that have passed all applicable tests, one assembled battery in a fully charged state shall be tested under tests T.3, T.4 and T.5, and, in addition, test T.7 in the case of a rechargeable battery.".

(Reference documents: ST/SG/AC.10/C.3/90/Add.1 and informal document INF.11 of the forty-fifth session, proposition 2)

38.3.3 Last paragraph, after sub-paragraph (f), becomes new sub-paragraph (g) and is amended to read as follows:

"(g) When batteries that have passed all applicable tests are electrically connected to form a battery in which the aggregate lithium content of all anodes, when fully charged, is more than 500 g, or in the case of a lithium ion battery, with a Watt-hour rating of more than 6 200 Wh, the assembled battery does not need to be tested if the assembled battery is of a type that has been verified as preventing:

(i) Overcharge;

(ii) Short circuits; and

(iii) Over discharge between the batteries.".

(Reference documents: ST/SG/AC.10/C.3/90/Add.1 and informal document INF.11 of the forty-fifth session, proposition 3)

38.3.4.4.1 Amend to read as follow:

"38.3.4.4.1 Purpose

This test assesses the robustness of cells and batteries against cumulative shocks.".

(Reference document: informal document INF.11 of the forty-fifth session, proposition 4 option 1.)

38.3.4.4.2 Amend to read as follows:

"38.3.4.4.2 Test procedure

Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery.

Each cell shall be subjected to a half-sine shock of peak acceleration of 150 g_n and pulse duration of 6 milliseconds. Alternatively, large cells may be subjected to a half-sine shock of peak acceleration of 50 g_n and pulse duration of 11 milliseconds.

Each battery shall be subjected to a half-sine shock of peak acceleration depending on the mass of the battery. The pulse duration shall be 6 milliseconds for small batteries and 11 milliseconds for large batteries. The formulas below are provided to calculate the appropriate minimum peak accelerations.

Battery	Minimum peak acceleration	Pulse duration
Small batteries	150 g_n or result of formula $Acceleration(g_n) = \sqrt{\left(\frac{100850}{mass^*}\right)}$ whichever is smaller	6 ms
Large batteries	50 g_n or result of formula $Acceleration(g_n) = \sqrt{\left(\frac{30000}{mass^*}\right)}$ whichever is smaller	11 ms

* Mass is expressed in kilograms.

NOTE: *IEC Standard 60068-2-27 (Fourth Edition 2008-02): Environmental testing-Part 2-27: Tests - Test Ea and guidance: Shock provides guidance on tolerance for acceleration and pulse duration.*

The relationship between minimum peak acceleration and mass is illustrated in Figure 1 for small batteries and Figure 2 for large batteries.

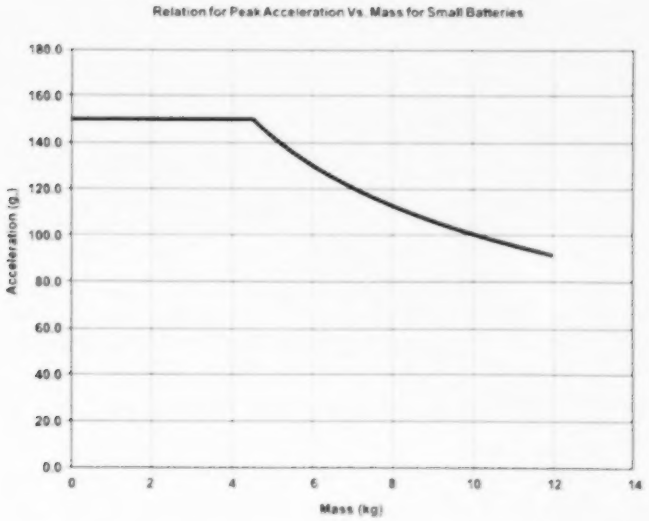


FIGURE 38.3.4.1: Relation between the Peak Acceleration and the Mass for small batteries (below 12.0 kg)

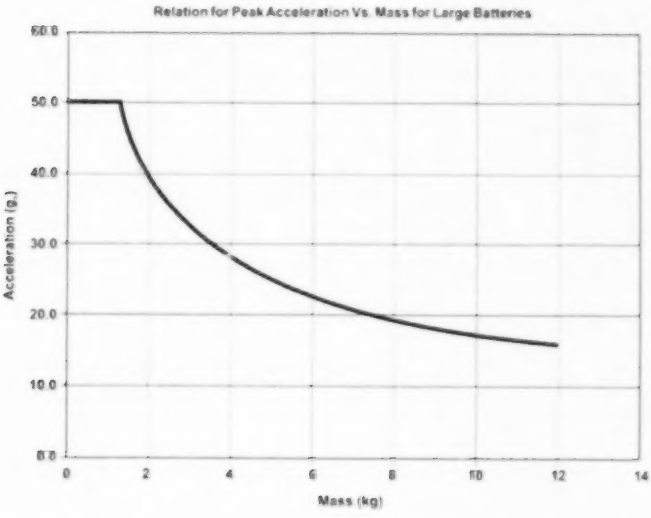


FIGURE 38.3.4.2: Relation between the Peak Acceleration and the Mass for large batteries (equal or above 12.0 kg)

Each cell or battery shall be subjected to three shocks in the positive direction and to three shocks in the negative direction in each of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks.

(Reference document: informal document INF.11 of the forty-fifth session, proposition 4 option 1)

38.3.4.5.2 Amend to read as follows:

"38.3.4.5.2 Test Procedure

The cell or battery to be tested shall be heated for a period of time necessary to reach a homogeneous stabilized temperature of 57 ± 4 °C, measured on the external case. This period of time depends on the size and design of the cell or battery and should be assessed and documented. If this assessment is not feasible, the exposure time shall be at least 6 hours for small cells and small batteries, and 12 hours for large cells and large batteries. Then the cell or battery at 57 ± 4 °C shall be subjected to one short circuit condition with a total external resistance of less than 0.1 ohm.

This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 57 ± 4 °C, or in the case of the large batteries, has decreased by half of the maximum temperature increase observed during the test and remains below that value.

The short circuit and cooling down phases shall be conducted at least at ambient temperature.".

(Reference document: informal document INF.11 of the forty-fifth session, proposition 5)

38.3.4.7.1 Amend to read as follows:

"This test evaluates the ability of a rechargeable battery or a single cell rechargeable battery to withstand an overcharge condition.".

(Reference document: ST/SG/AC.10/C.3/90/Add.1)

Add a new sub-section 38.4 to read as follows:

"38.4 Substances evolving flammable vapour

38.4.1 Purpose

This section of the Manual presents the test procedure to determine whether during handling, transport and storage substances of Class 9 evolving flammable vapours (see UN No. 2211), are able to evolve a dangerous concentration of flammable vapours in closed containers resulting in the formation of a flammable atmosphere and, as a consequence, have to be classified or not.

38.4.2 Scope

The scope of the test method is to determine whether polymeric beads with encapsulated blowing agent, fulfilling the description of UN No. 2211, need not to be classified under these UN numbers.

38.4.3 Classification procedure for substances liable to evolve flammable vapours

Polymeric beads with encapsulated blowing agent shall be tested according to the procedures below to determine whether classification under UN No. 2211 is needed.

38.4.4 Test U 1: Test method for substances liable to evolve flammable vapours

38.4.4.1 Introduction

The ability to evolve flammable vapours is determined by placing the substance in a hermetically closed glass bottle, at a specified temperature for a prescribed period of time, and then, determine the identity and concentration of flammable vapours.

38.4.4.2 Apparatus and materials

A serum flask equipped with polytetrafluoroethylene septa with a volume of 50 ml to allow for enough samples to be analysed. A heating cabinet for storage of samples at prescribed time and temperature. A gas chromatographic (GC) apparatus and accompanying equipment, for analysis of flammable vapour concentration in the gas-phase.

38.4.4.3 Procedure

The substance as offered for transport should be put in a serum flask of 50 ml, with a degree of filling of 50 % volume ratio and sealed with polytetrafluoroethylene septa. The sealed flask is put into a heating cabinet at a minimum of 50 °C for 14 days. Under these conditions analyse the gas twice by gas chromatography and calculate the average concentration of the flammable vapour. The test shall be performed on three samples of the same substance.

38.4.4.4 Test criteria and method of assessing results

Substances need not be classified as Polymeric beads, expandable if the concentration of the flammable vapours is less than or equal to 20% of the Lower Explosive Limit (LEL) of the flammable vapour in all of the three samples.".

(Reference document: ST/SG/AC.10/C.3/2014/77)

Insert a new Part 5 to read as follows:

"Part V

Classification procedures, test methods and criteria relating to sectors other than transport

Section 50

Introduction to Part V

50.1 Purpose

Part V of the Manual presents the United Nations schemes for the classification of desensitized explosives for supply and use (including storage) according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

50.2 Scope

The test methods of this Part should be applied when required by the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

Section 51

Classification procedures, test methods and criteria relating to the hazard class desensitized explosives

51.1 Purpose

51.1.1 This section presents the United Nations scheme of the classification of liquid and solid desensitized explosives see Chapter 2.17 of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS)). The text should be used in conjunction with the classification principles of Chapter 2.17 of the GHS and the test series given in sub-sections 16.4 and 16.5 of this Manual.

For testing of liquid desensitized explosives for transport purposes, refer to section 32, sub-section 32.3.2 of this Manual. Testing of solid desensitized explosives for transport purposes is addressed in section 33, sub-section 33.2.3 of this Manual, Chapter 2.4, sub-section 2.4.2.4 of the United Nations Recommendations on the Transport of Dangerous Goods, Model Regulations (for solid desensitized explosives) and in Chapter 2.3, sub-section 2.3.1.4 of the Model Regulations (for liquid desensitized explosives).

51.2 Scope

51.2.1 Desensitized explosives are solid or liquid explosive substances or mixtures which are phlegmatized to suppress their explosive properties in such a manner that they may be excluded from the hazard class "Explosives" (Chapter 2.1 of GHS). Desensitized explosives, should be first tested according to the tests series 1 (type 1(a)), 2 and 6 (type (a) and (b), respectively) of this Manual[1].

51.2.2 The appropriate classification procedures for desensitized explosives should be undertaken before they are offered for supply and use unless:

(a) They are manufactured with the view to producing a practical, explosive or pyrotechnic effect;

(b) They have a mass explosion hazard according to Test Series 6(a) or 6(b) or their corrected burning rate according to the burning rate test 51.4 is more than 1 200 kg/min;

(c) Their exothermic decomposition energy is less than 300 J/g[2].

[1] Unstable explosives as defined in Chapter 2.1 of GHS can also be stabilized by desensitization and consequently may be classified as desensitized explosive, provided all criteria of Chapter 2.17 of GHS are met. In this case the desensitized explosive should be tested according to test series 3 (Part I of this Manual) because information about its sensitiveness to mechanical stimuli is likely to be important for determining conditions for safe handling and use. The results should be communicated in the safety data sheet.

[2] The exothermic decomposition energy should be determined using the explosive already desensitized (i.e. the homogenous solid or liquids mixture formed by the explosive and the substance(s) used to suppress its explosive properties). The exothermic decomposition energy may be estimated using a suitable calorimetric technique (see Section 20, sub-section 20.3.3.3 in Part II of this Manual).

51.3 Classification procedure

51.3.1 Before packaged substances or mixtures are subjected to the burning rate test, the test series 6 types 6 (a) and 6 (b) shall be performed in alphabetical order. The substances or mixtures should be tested first with a standard detonator (Appendix 1 of the Manual) and, if no explosion occurs, with an igniter just sufficient (but not more than 30 g of black powder) to ensure ignition of the substance or mixture in the packaging. The initiation system giving a positive result in the 6 (a) test should be used for the 6 (b) test.

51.3.2 However, it is not always necessary to conduct tests of all types. Test type 6 (b) may be waived if in each type 6 (a) test:

(a) The exterior of the package is undamaged by internal detonation and/or ignition; or

(b) The contents of the package fail to explode, or explode so feebly as would exclude propagation of the explosive effect from one package to another in test type 6(b).

51.3.3 If a substance or mixture gives a negative result (no propagation of detonation) in the Series 1 type 1(a) test, the 6(a) test with a detonator may be waived[3]. If a substance or mixture gives a negative result (no or slow deflagration) in a Series 2 type 2(c) test, the 6 (a) test with an igniter may be waived.

51.3.4 The test for determination of the burning rate by large-scale test need not be performed if, in a test type 6 (b), there is practically instantaneous explosion of virtually the total contents of the stack. In such cases the product is assigned to Division 1.1.

51.4 Burning rate test (external fire)

51.4.1 ***Introduction***

51.4.1.1 The test method for determination of the burning rate (10 000 kg scale burning rate) is to be used to determine the behaviour of substances or mixtures as packaged for storage and use if involved in an external fire. This test is performed with several packages of the substances or mixtures to determine

(a) Whether there is a mass explosion hazard, a hazard from dangerous projection or a too violent burning,

(b) A burning rate (10 000 kg scaled), which depends on the total mass.

51.4.1.2 The burning rate is defined as the extrapolated burning rate for a mass of 10 000 kg packaged material. In practice, this burning rate is determined using both a single package and stacks of packages, following by an extrapolation procedure. The tests are performed with the substances or mixtures in the packages as provided for storage and use. All types of packages are subjected to the tests unless:

(a) A substance or mixture, as packed for supply and use, may be unambiguously assigned to a burning rate and category by a competent authority on the basis of results from other tests or of available information; or

(b) The substance or mixture, as packed for supply and use, is assigned to the hazard class "Explosives", Division 1.1.

[3] If the type 1 (a) test is not carried out the Series 6 type 6(a) test cannot be waived.

51.4.1.3 The corrected burning rate (10 000 kg scaled) is to be used for classification into four different categories.

51.4.2 ***Apparatus and materials***

51.4.2.1 The test should be applied to packages of substances or mixtures in the condition and form in which they are offered for supply and use (including storage). The following elements are needed:

(a) A number of 1, 6 and 10 packages, with a net mass of desensitized explosive of 25 kg in each package;

(b) A number of 1, 3 and 6 packages, with a net mass of desensitized explosive between 25 kg and 50 kg in each package;

(c) A number of 1 and up to six packages, with a net mass of desensitized explosive of more than 50 kg, the total net mass should not be greater than 500 kg;

(d) One or two trays with an adequate size and height to contain the wooden pallets and the packages and to protect the ground;

(e) Wooden pallets (e.g. according to DIN 15146), with wood-wool distributed between, under and above the packages;

(f) A suitable ignition source guaranteeing the ignition of the wooden pallets/wood-wool and consequently the tested packages (a mixture of gasoline and light fuel oil 10/90 evenly distributed over the packages and the wood-wool is recommended);

(g) Cine and/or video cameras and suitable equipment to measure the heat of radiation, e.g. infrared sensors and/or thermo cameras.

51.4.2.2 The number of tests and/or the total mass (whereas necessary) should be increased if the test results are ambiguous and the corresponding hazards cannot be clearly defined.

51.4.3 ***Procedure***

51.4.3.1 The tests start with a single package and then the number of packages are successively increased as mentioned under 51.4.2.1 (a), (b) or (c). Normally the burning rate test should be performed once for each number of packages. The required numbers of packages, in the condition and way in which they are offered for supply and use (including storage), are arranged in such way, that the most severe results are anticipated, on wooden and leveled pallets. The pallets are placed in one (or two, if necessary) trays. A tray must comprise at least one complete pallet including 10 cm open space all around the pallet. Flammable material (wood-wool, paper, etc.) is placed under and around the packages in such a way that an optimum ignition is guaranteed (see 51.4.2.1 (f)).

NOTE *A quantity of about 10 kg dry wood-wool is usually sufficient. The wooden pallets and the dry wood-wool shall be soaked with a liquid mixture of fuel (about 10 liter, see 51.4.2.1 (f)).*

51.4.3.2 The heat of radiation is measured during the test by suitable equipment, at least at three locations with three different distances from the seat of fire (the distances depend on the sensitivity of the equipment (sensors, thermo camera, etc.) and should be calculated before the test.

51.4.3 The signals are continuously recorded. The starting-point of the fire outbreak is defined as the moment when a reaction of the substance is detected. The end of the fire is determined from registered radiation curves.

51.4.3.4 If a mass explosion or individual explosions or metallic projections (fragments) are observed this should be noted in the test report.

51.4.4 ***Test criteria and method of assessing results***

51.4.4.1 The burning rates A and A_{10t} are determined as follows:

(a) The starting point of the fire is defined as the moment at which the substance or mixture reacts detectably. The end of the fire is characterized by a decrease in radiation level I (as caused by the fire) to less than 5 % of the maximum level (I_{max}) (see Figure 51.4.1);

(b) The effect of either remainder or burning materials, if present, shall be taken into account in the evaluation;

(c) The burning time t is the time span between the starting point and the end of the fire;

(d) The burning rate A [kg/min] can be calculated for each tested quantity m [kg] and its corresponding burning time t [min] from the equation:

$$A = \frac{m}{t}$$

(e) log A is plotted against log m, where A is the determined burning rate, and m is the mass of substance or mixture used for the test. The observed test results are extrapolated by means of this graph to an uncorrected burning rate A_{10t} for a mass of 10 000 kg corresponding to the following function:

$$A_{10t} = \left(\frac{10000\ kg}{m}\right)^{\frac{2}{3}} \cdot A$$

51.4.4.2 The corrected burning rate A_c is determined as follows:

(a) The internal amount of energy of the substance is partially converted into radiation. The percent average radiation efficiency η at a distance from the fire is determined from the measured radiation level ($dose_{measured}$) and the theoretical maximum energy ($dose_{calculated}$):

$$\eta = \frac{dose_{measured}}{dose_{caculated}}$$

(b) The theoretical maximum energy is calculated by multiplying the individual mass of tested substance m [kg] with the heat of combustion H_v [kJ/kg][4]

$$dose_{calculated} = H_v \cdot m$$

(c) The amount of energy that in practice appears to be transferred by radiation is determined by integrating the area below the measured radiation curve:

$$dose_{measured} = f(t) = \left[\sum_{t=start}^{end} \frac{(I_{(t+\Delta t)} + I_t}{2} \cdot \Delta t\right] \cdot 4\,\pi \cdot r^2$$

[4] Should be determined by a suitable technique e g. combustion calorimeter.

The numerical integration of the radiation intensities I_r [W/m²] over the total burning time delivers $dose_{measured}$ [kJ] at the distance r [m].

(d) To this end a graph is made showing the radiation level I [kW/m²] as a function of time. The complete radiation dose is calculated by integration of the smoothed and corrected curve down to 1 % to 5 % of I_{max};

(e) $I_{relevant}$ is obtained from the maximum of the curve of heat radiation calculated as average value of the radiation by converting the integrated area in a rectangle of equal size during the same time span;

(f) The form factor f that must be taken into account during the maximum fire intensity can be averaged from the formula:

$$f = \frac{I_{relevant}}{I_{calculated}}$$

(g) The corrected burning rate A_c is calculated as follows:

$$A_c = A_{10\%} \cdot \frac{H_c}{35500} \cdot \frac{\eta}{0.25} \cdot \frac{f}{2.75}$$

Where H_c is the heat of combustion of the substance [kJ/kg] (i.e. reaction enthalpy of the burning reaction); η is the radiation efficiency and f the form factor. A_c is the corrected burning rate [kg/min] for a quantity of 10 000 kg.

51.4.4.3 If a mass explosion or individual explosions or metallic projections (fragments) occur the substance or mixture is classified in the hazard class "explosives".

51.4.4.4 The test results are assessed on the basis of the corrected burning rate A_C for a quantity of 10 000 kg of the packaged substance or mixture.

51.4.4.5 The test criteria for determining the burning behavior of substances or mixtures are:

Category 1: Any substance or mixture with a corrected burning rate A_C equal to or greater than 300 kg/min but not more than 1200 kg/min;

Category 2: Any substance or mixture with a corrected burning rate A_C equal to or greater than 140 kg/min but less than 300 kg/min;

Category 3: Any substance or mixture with a corrected burning rate A_C equal to or greater than 60 kg/min but less than 140 kg/min;

Category 4: Any substance or mixture with a corrected burning rate AC less than 60 kg/min.

Any substance or mixture with a corrected burning rate greater than 1200 kg/min is classified as an explosive (See Chapter 2.1 of the GHS).

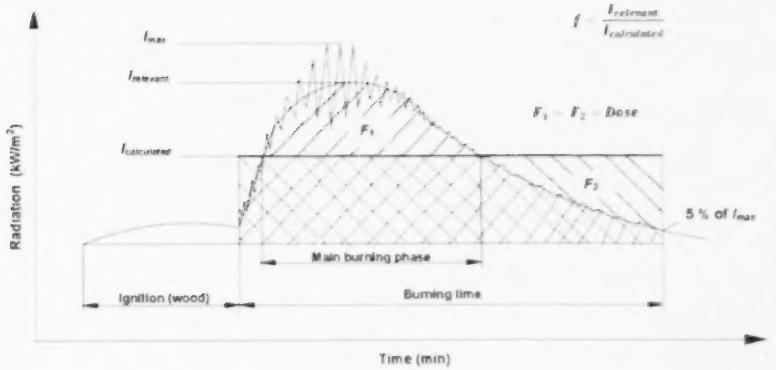


Figure 51.4.1: Measurement of radiation as a function of time

51.4.5 *Examples of results*

51.4.5.1 The nitrocellulose formulations are packed in fiber drums (1G) with a maximum mass of 140 kg and fiber board boxes (4G) with a maximum mass of 25 kg, assigned to categories as follows:

(a) Ester soluble (E-grades) nitrocellulose formulations with different phlegmatizers and a nitrogen content of 11.8 % to 12.3 %

NC-type	IPA 35%	IPA 30%	ETH 35%	ETH 30%	BUT 35%	BUT 30%	Water	Chips[a]
12E	3	2	4	3	2	1 (330 kg/min)	4	1 (1115 kg/min)
22E	3	3	4	3	3	3	4	1 (1115 kg/min)
25E	3	3	4	3	3	3	3	1 (1115 kg/min)

IPA (Isopropanol), ETH (Ethanol), BUT (Butanol).
[a] NC-Chips with 20 % plasticizer

(b) Medium soluble (M-grades) nitrocellulose formulations with different phlegmatizers and a nitrogen content of 11.3 % to 11.8 %

NC-type	IPA 35%	IPA 30%	ETH 35%	ETH 30%	BUT 35%	BUT 30%	Water	Chips[a]
15M	-	-	-	-	3	2	-	
27M	3	3	4	4	3	3	4	1 (1115 kg/min)
34M	3	3	4	4	4	-	-	1 (1115 kg/min)

IPA (Isopropanol), ETH (Ethanol), BUT (Butanol).
[a] NC-Chips with 20 % plasticizer

(c) Alcohol soluble (A-grades) nitrocellulose formulations with different phlegmatizers and a nitrogen content of 10.7 % to 11.3 %

NC-type	IPA 35%	IPA 30%	ETH 35%	ETH 30%	BUT 35%	BUT 30%	Water	Chips[a)]
15A	4	3	4	3	3	2	-	1 (1115 kg/min)
30A	4	3	4	4	3	3	4	1 (1115 kg/min)
32 A	4	3	4	4	4	3	-	-

IPA (Isopropanol), ETH (Ethanol), BUT (Butanol),
[a)] NC-Chips with 20 % plasticizer

51.4.6 ***Example of a calculation***

NC-formulation (nitrogen content 10.7 % to 11.2 %) wetted with 30 % isopropanol:

Mass of the tested NC formulation: $m = 285$ kg
Burning time: $t = 9.7$ min
Form factor: $f = 3.73$
Radiation efficiency: $\eta = 0.24$
Enthalpy of combustion: $H_c = 15626$ kJ/kg

Calculation of the burning rate A:

$$A = \frac{m}{t} = \frac{285\ kg}{9.7\ min} = 29.4\ \frac{kg}{min}$$

Calculation of the burning rate A_{10t}:

$$A_{10t} = \left(\frac{10000\ kg}{m}\right)^{\frac{2}{3}} \cdot A = \left(\frac{10000\ kg}{285\ kg}\right)^{\frac{2}{3}} \cdot 29.4\ \frac{kg}{min} = 315\ \frac{kg}{min}$$

Calculation of the corrected burning rate A_c

$$A_c = A_{10t} \cdot \frac{H_c}{33500} \cdot \frac{\eta}{0.25} \cdot \frac{f}{2.78} = 315\ \frac{kg}{min} \cdot \frac{15626\ \frac{kJ}{kg}}{33500\ \frac{kJ}{kg}} \cdot \frac{0.24}{0.25} \cdot \frac{3.73}{2.78} = 189\ \frac{kg}{min}$$

The desensitized explosive is classified in category 2.".

(Reference document: ST/SG/AC.10/C.3/2014/2)

Appendix 6

3.3 (c) Amend to read as follows:

"(c) For the organic substance or a homogenous mixture of organic substances containing chemical group (or groups) associated with explosive properties:

- when the exothermic decomposition energy is less than 500 J/g, or

- when the onset of exothermic decomposition is 500 °C or above

as indicated by Table A6.2.

Table A6.2 DECISION TO APPLY THE ACCEPTANCE PROCEDURE FOR CLASS 1 FOR AN ORGANIC SUBSTANCE OR A HOMOGENOUS MIXTURE OF ORGANIC SUBSTANCES

Decomposition energy (J/g)	Decomposition onset temperature (°C)	Apply acceptance procedure for Class

		I? (Yes/No)
< 500	< 500	No
< 500	≥ 500	No
≥ 500	< 500	Yes
≥ 500	≥ 500	No

The exothermic decomposition energy may be determined using a suitable calorimetric technique (see 20.3.3.3); or".

5.1 (a) Amend the reference to Table A6.2 to read "Table A6.3".

5.1. Table A6.2 Renumber as A6.3.

(Reference document: ST/SG/AC.10/C.3/86/Add.1)

Appendix 7

In section 4, second sentence:

Amend the beginning to read as follows:

"The result is considered positive "+" and the pyrotechnic substances in powder form or as pyrotechnic units as presented in the fireworks, that are used in waterfalls, or…."

Replace "8 ms" by "6 ms".

Remainder unchanged.

(Reference document: ST/SG/AC.10/C.3/2014/84 as amended)

Add a new Appendix 9 to read as follows:

"**Appendix 9**

Ballistic projection energy test for cartridges, small arms (UN No. 0012)

1. Introduction

This test is conducted with candidates for Cartridges, small arms (UN No. 0012) with individual cartridges and is used to determine the maximum possible energy of a projection that could be generated upon functioning in transport. The test takes worst-case conditions into account, since no packaging attenuates the energy of the projectile and the cartridge is supported by a fixed anvil block. It is not necessary to reverse the test set-up to a situation where the cartridge is propelled, because experimentation shows that energy transfer from the propellant to the bullet is equal or more than that to the case.

2. Apparatus and materials

The following items are required:

(a) A suitable actuator to initiate ammunition; and

(b) A ballistic pendulum with an interception device for the projectile for determining the energy, or a high-speed camera and a background with a scale to determine the velocity of the projectile.

3. Procedure

The test is performed on single cartridges. The cartridge is actuated as designed by means of the primer cap and a firing pin. The cartridge, actuator and measuring device are arranged along the flight path in such a way that angle errors are minimized. The test is performed three times.

4. Test criteria and method of assessing the results

The energy of the projectile is calculated either from the maximum displacement of the ballistic pendulum or from the velocity (v) determined by the high-speed camera taking the mass (m) of the projectile into account. The value of energy (E) can be calculated from the equation:

$$E = \frac{1}{2}mv^2$$

If the energy of the projectile does not exceed 8 J in any of the test runs, the article in the appropriate packaging in accordance with Chapter 3.2 of the Model Regulations, may be assigned to Cartridges, small arms (UN No. 0012).".

(Reference documents: ST/SG/AC.10/C.3/2014/109)